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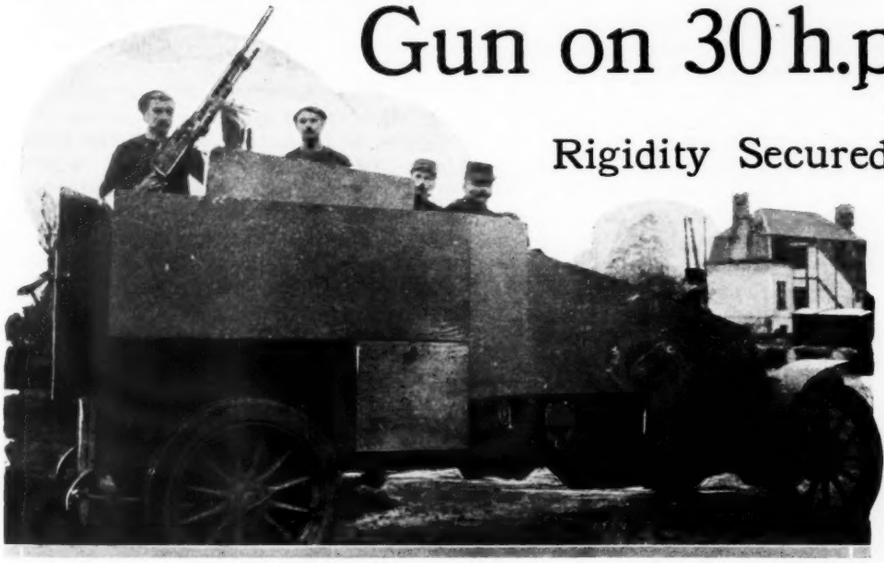
THE AUTOMOBILE

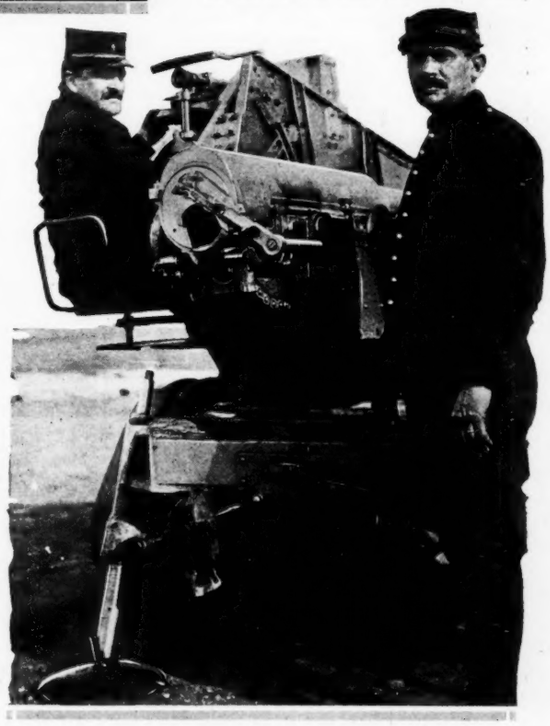
French Mount 75 mm. Gun on 30 h.p. Chassis

Rigidity Secured by Swivel Jacks —Artillery Tractors—Allies Gain in Truck Fleets



Left—Renault with high-angle gun manned by French infantry and Zouaves

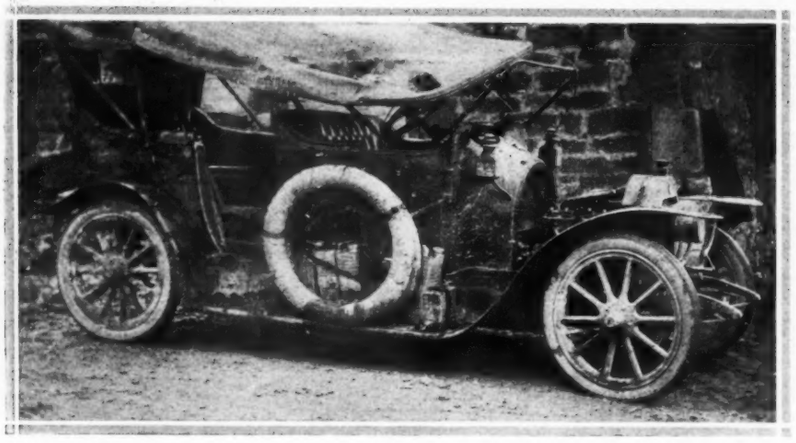
Below—French 75 mm. gun mounted on chassis. This is the first photograph of this gun ever taken



By W. F. Bradley

Special Representative of THE AUTOMOBILE *with the Allied Armies in France*

PARIS, Jan. 30—France's most formidable weapon, the 75 mm. gun, the rival of the German 77, is now being used very extensively mounted on an automobile chassis. This improvement had just been completed when war broke out, but no time had been available for building the chassis and fitting the gun to it. The adoption of the new weapon has therefore been carried out while the nation is at war. No serious problems were presented in the automobile itself, but the mounting called for careful work and it was necessary to cut out the action of the spring in order to give to the entire base the same degree of rigidity as with the ordinary horse-drawn gun carriage. A 30 horsepower chassis is used, the make principally employed being De Dion Bouton. No armor plating is fitted to the chassis, for a gun of this size is not intended for reconnoitering or ordinary road work. Obviously, details of the automobile fittings are as carefully guarded as the details of the gun itself. Briefly, the gun is mounted on a pivot carried on a steel platform bolted to the frame members; normally, it is directed forward, over the heads of the driver and his assistant. The gunner has a seat attached to the rear left side of the gun, this seat being attached to and revolving with the gun pivot. When the gun is about to be brought into action, the chassis is raised from the ground just sufficiently to remove all weight from the springs, but not to lift the road wheels. This raising is obtained by means of four special hydraulic jacks, one attached to each corner of the chassis, and capable of being operated simul-



The fortunes of war. A battle-scarred French car at the corner of village street near Soissons

taneously and instantaneously. Each jack consists of a stout steel leg, inclined a few degrees from the vertical, and having at its lower extremity a big diameter circular foot, flat on its under surface. These give sufficient area to carry the weight of the chassis and gun on all ordinary surfaces.

The great advantage of this new weapon which, it should be noted, is receiving its first application in this war, and had not even been tried out in maneuvers, is the extra mobility it gives to the batteries. A horse-drawn battery of 75 mm. guns does not average more than 4 miles an hour under best road conditions. Under similar circumstances a battery of 75 mm. automobile guns can maintain an average speed of 12 miles an hour. The only problem, therefore, was to perfect the details of the chassis so that the automobile gun could get into action as quickly as the horse-drawn type. This has been accomplished, with the result that the automobile 75 mm. gun is decidedly the more formidable weapon.

The French gun discharges a projectile weighing 7 kilos 240 at an initial speed of 530 metres. The German 77 mm. gun sends a projectile of 6 kilos 850, at an initial speed of 465 metres. Another advantage of the French gun is the method of mounting and the hydraulic brake which removes even the slightest variation in the angle of the gun after each shot has been fired. In other words, the range having been given, there will not be the least necessity to set the gun again, no matter what number of shots may be fired. A French battery of 75 mm. consists of four guns. The German 77 mm. battery comprises six guns. The French claim that the choice of four guns is more rational, and that one of their batteries is superior to the larger German battery.

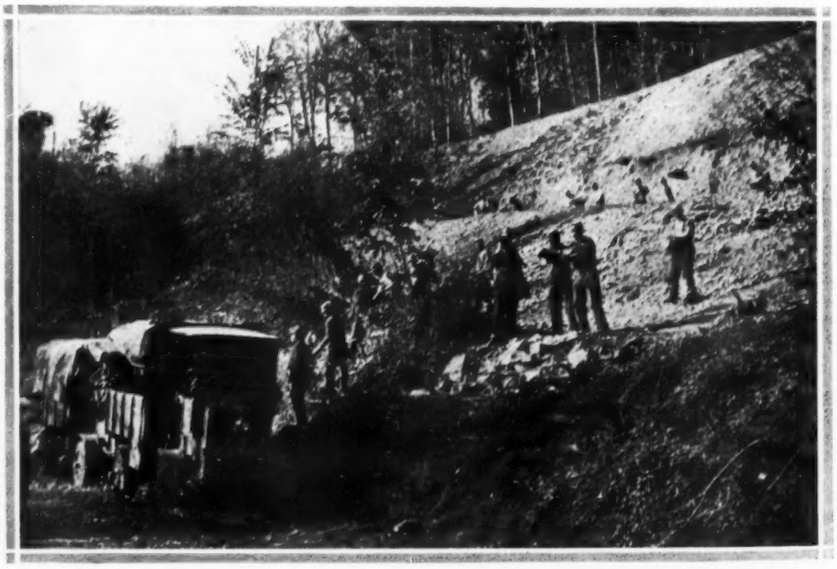
Special Ammunition Wagons

Comprised with the 75 mm. French batteries are automobile ammunition wagons of a special design. The majority of these vehicles have been furnished by the De Dion Bouton company, and are that firm's 30-horsepower chassis with important modifications. The motor is carried under a bonnet; drive is taken to the rear wheels by transverse cardan shafts, in the special De Dion Bouton manner. In addition, a powerful winding drum with steel cable is fitted within the frame, back of the gearbox, thus making it possible for this vehicle to haul itself out of a tight place, or to pull the gun out of soft ground. On the chassis is a wood and metal body divided into several large lockers, each one being subdivided into divisions made to receive a 75 mm. shell.

The 75 mm. gun appears to be the largest weapon mounted on and fired from an automobile chassis. There are hundreds of lighter vehicles in use fitted with one or two mitrailleuses, but these are for an entirely different kind of work from that undertaken by the bigger gun. Much of the heavier French artillery is now motor hauled. These must not be confused with guns which are motor-carried.

The Use of Tractors

Many of the cannon of 105, 120 and 155 mm. are hauled by motor tractors. It does not appear that the French 280 mm. gun makes use of automobile traction. It is claimed that this gun has a considerably greater mobility than the German weapon of the same calibre, for it can be dismounted into four parts, each of which can be drawn by six horses. The use of gasoline tractors is not entirely new, for the French have studied this problem of the abolition of the horse in artillery work for at least 3 years, and had developed a most successful type of tractor before war was declared. A 120 mm. battery consists of seven tractors, each one with a 35-horsepower motor driving to front and rear wheels, both sets of wheels being steerers as well as drivers. The make most largely employed is Panhard-Levassor, others being Renault, Latil and Schneider. Each tractor carries the men necessary for handling the gun, it hauls one ammunition wagon, and finally the gun on a special type of four-wheel carriage. The average speed on roads is 12 miles an hour. Across country, where no serious obstacles have to be met, a speed of 6 miles an hour is maintained. Naturally this is reduced if the nature of the ground necessitates the fitting of paddles or chains to the wheels, or if the motor driven capstan has to be brought into operation to get the tractor out of a difficult position or pull the gun and ammunition wagon up hills which cannot be climbed in the ordinary way. Each tractor replaces from twenty-five to thirty horses. In



French trucks bringing up men and trenching tools for French construction in the Argonne district

Peugeot cars fitted with quick-firing guns. These cars are credited with great execution

addition to the higher speed on the road, these batteries have the great advantage of being able to get under way in a much shorter space of time than is necessary for bringing up horses. I have timed a battery which was in position on soft, sandy ground, some distance from a main road, which ceased firing and got clear away from the position it occupied within 5 minutes. Attached to each of these heavy batteries is a reserve tractor carrying chains, paddles, ropes, and other material necessary for use under adverse conditions. The tractor is also ready as a stand-by in case of break down.

Double-Steer, Double-Gun Light Cars

Recent additions to the French artillery consist of the lighter type of Peugeot high-speed chassis fitted with double steering wheels, so that the driver can face either front or back, a couple of reverse gears, and two quick firing guns, each one having a horizontal range of 180 degrees. In producing these armed cars the French have merely copied German example, for on the outbreak of the war the enemy had in readiness large numbers of light, fast, armored automobiles with which it was possible to make rapid attacks and strike terror into small forces and the civilian populations. This movement was followed on the part of the Allies by the fitting up of ordinary touring car chassis with armor plating and the mounting of a gun on the platform. The final development is the adoption of double steering and two speed reverse.

One of the surprising features of this war is the revelations it has made of the respective automobile strength of England, France and Germany. According to the most reliable statistics, England had a decided lead over any other European country in the number of commercial vehicles and motorcycles, a slight lead over France in the number of private cars, and a substantial lead over Germany. The indications were that France and England would put into the field the greater number of automobiles than Germany possessed. It is now seen that for military purposes England possessed a mere handful of automobiles. Her subsidy scheme had not met with success. The war department fixed on a certain type, admirably suited for their purpose, and asked manufacturers to build it and the public to buy it. Neither party responded, with the result that when war broke out the English authorities had to requisition thousands of trucks in the hands of private owners and had to place orders for the ordinary commercial type with every manufacturer willing to execute the same. From the day war broke out until the present moment, requisitions of suitable types of trucks have been carried out, until commercial England now possess but its steam wagons, the trucks of absolute necessity to civil and military home life, and the older models unsuitable for sending abroad.

In France the situation was different, for although the French army, like that of England, possessed but a small number of trucks in active service, and had no armored cars whatsoever, it was able to make use of its well developed subsidy scheme which automatically brought several thousand trucks into army service with the call to mobilization. This, however, was not sufficient, and after the subsidy types had all been taken, other privately owned vehicles were requisitioned until France is more completely cleared of privately owned trucks than is England. So searching has been the call that it is doubtful if there are to be found in Paris and neighborhood six automobile trucks not in direct army service or in public work on which the army is dependent.

Germany's Many Trucks

Germany's situation was strangely contrasting. Knowing that she had not the same civilian resources to fall back upon as her neighbors, she had secured for permanent army service a quantity of all types of automobiles in comparison with which the fleets of England and France looked ridiculous. Authorities had been content to accept the official figures given out by England, France and Germany, and note with satisfaction that on a total count Germany was decidedly inferior. It was not until war had broken out that the realization came that Germany's inferiority only applied to the total count, and that in the number and quality of automobiles for immediate military service, she was far ahead of any of her opponents. Thus, while German armored cars were scurrying across Belgium, the automobile service of the Belgian army was arranging with manufacturers to obtain from fireproof safe makers the necessary steel plates for converting touring car chassis into instruments of war. In France and England the situation was practically the same.

Official statistics published last year showed that there were 60,876 touring cars in use in Germany during the preceding year. At the same date France possessed 90,959. English returns, being based on registrations, are less accurate than those of France and Germany. It is probable, however, that England had not less than 120,000 touring cars. Germany possessed 9,739 trucks. The number in France cannot be determined with the same degree of ac-

Below—French Red Cross automobile bringing in wounded to the train in which they will be carried far away from the scene of the fighting

Above—Women and children being removed from the danger zone around the village of Soissons by a Red Cross automobile

curacy, for trucks are taxed in a different manner and are not under the rigid fiscal control as private cars. The French fleet can reasonably be set down as 18,000 to 20,000, or twice as many as Germany. England probably possessed 25,000 to 30,000 commercial vehicles at the outbreak of war. These are not military but civil figures, and the advantage which France and England appeared to have over Germany at the outbreak of war did not exist in reality.

The Situation Reversed

During the 6 months the war has been in progress the situation has been reversed. Germany has not the productive resources of her rivals. She is cut off to a very large extent from outside supplies. Italy has been furnishing a small number of trucks and probably some American trucks have gone into the Fatherland through Italy. Assuming that the German automobile factories have been working at full pressure on army orders, her output is considerably less than that of France, where work has also been carried on at an intensive rate. France and England have been able to call in an almost unlimited supply of automobiles from America. By turning all the resources of the passenger car factories into the commercial field, it has been possible to produce trucks at a greater rate than during times of peace. There is a shortage of men and of certain grades of material, but this shortage is not sufficient to interfere with the production of motor trucks at a good rate.

The Allies Are Prepared

It is obvious to any observer that the next phase of the war will entail more aggressive action on the part of the Allies. So far as the motor phase of this action is concerned, the Allies are in a decidedly better position than the Germans. The special armored types of vehicles which they had failed to produce prior to the war have now been brought into existence. While Germany's automobile fleet has decreased with 6 months' active service, that of England and France has been augmented in proportions which would cause surprise if figures could be revealed. If Germany is driven out of Belgium, there will be no railways for the use of the Allies. Thus men, food, and guns will have to be brought up by automobile. All this has been provided for on a scale which makes it possible for practically the whole of the Allied armies to travel forward on gasoline.

Restrictions on Private Automobile Travel in France Increase

EARLY in September the German army entered the town of Senlis, 24 miles northeast of Paris, and claiming that shots had been fired by civilians, set fire to all the buildings in the main street, shot the mayor, and buried him head downwards in a field. A few days later the retreating French and British forces were pulled up smartly by General Joffre, faced around, and told that they were to fight and win, or die on the spot. They routed the German armies, driving them back to the Aisne, a distance of nearly 30 miles. The various centers of that series of battles on the Marne, in which probably 2,000,000 troops were engaged, and where the dead and wounded were counted by thousands, are from 20 to 40 miles due east of Paris.

If the mayor of Trenton, N. J., had been shot and half his town burned by an armed force; if one of the world's greatest battles had been fought but a few miles to the east of Brooklyn, it can be imagined that the civil and military authorities would have a difficult task to keep New Yorkers away from such spots. If the rail roads and trolley car services were cut off, there would apparently be nothing to prevent motorists going out; indeed the man who owned an automobile might be expected to be the first and the most persistent visitor to the places which must loom big in the history of nations. But a supposition as to what would doubtless happen around New York gives no indication as to what really has happened around Paris. The civilian motorists who have been able to make the 25 to 40 mile run from Paris to Senlis and the battlefield of the Marne might be counted on the fingers of one hand. Those battles were great victories for the French, they were fought more than four months ago, the districts are now cleared of troops, the wreckage has been gathered up, the dead have all been buried, the wounded have all been evacuated—yet to make an automobile trip into this neighborhood is more difficult than a mid-winter journey from New York to Seattle.

Many Restrictions

Automobile travel has never been absolutely forbidden in France, but it has been subjected to such restrictions that the man who is willing to undertake it must be possessed of more patience than the early enthusiasts who went from

New York to Philadelphia in 3 days and were proud of the feat. In the early days, or rather the early hours, of the war, every village and hamlet in France formed a guard for the protection of the roads. They were old men and boys; armed with every kind of arm from a shotgun to a modern army rifle, and they went on duty within a few hours of the order for mobilization. Sometimes they used their rifles first and asked for explanations afterwards. Such accidents were too trifling to get in the newspapers, even if there had been no censor to keep them out.

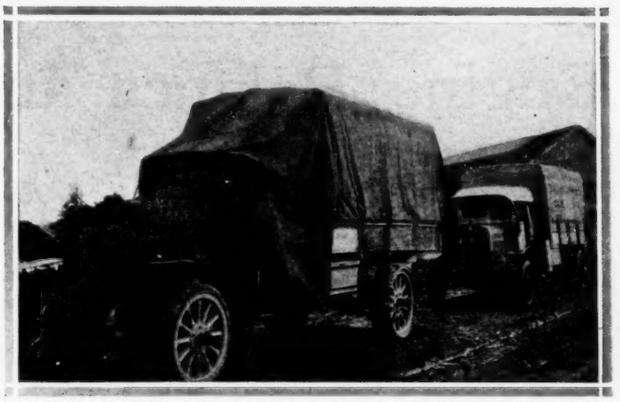
Such a system produced fussiness, not efficiency. It held back soldiers who were entrusted with urgent, life and death, messages, and it let through the skilful spy and the idler who had a pull with some local authority. Now all that is changed. There are plenty of men who have a pull, but they invariably find that there is nothing at the end of it. Nearly 6 months' war experience has been sufficient to put the army authorities wise to all the subterfuges for securing automobile permits, and to reduce the travelers by road to the lowest number and hold them to the narrowest and most restricted area.

Newspaper men gave the greatest trouble. They had influence with the police, with the civil authorities, with army officers, and as the Frenchman considers the law is made for the other fellow, they found means of making use of cars. By an unfortunate accident half a dozen Paris newspaper reporters happened to pull up their car in the midst of a group of staff officers who were studying maps. General Joffre was in that group, and although the commander in chief of the allied forces has a reputation for self-restraint, he saw red for a few moments and issued orders which have made even newspaper men hesitate before driving into the war area. A group of American and English war correspondents, trading on their influence with the ambassador, secured a valid military pass to travel in a Packard car to the scene of operations. Chance took them into the village occupied by the general staff of one of the British armies. They were arrested, imprisoned in a barn, their car retained for army service and at the end of a week released on a promise that they would not write anything for 6 days.

Red Cross Is Wary

It seemed an easy matter for newspaper men to loan their cars to the Red Cross organizations, or to offer their services as stretcher bearers to the convoys going to the front. Some time ago this was frequently done; but the army became wise to the move. Now the officials of the various Red Cross organizations are afraid of their own shadows. A man who offers a car is first of all looked upon with suspicion. When the Red Cross authorities are convinced of his good intentions, detectives pry into his life's history, and if he should have had any connection with newspapers, if he has written a magazine article, if he is 90 degrees removed from a German family, they decide to take no chances. One prominent English newspaperman slipped on overalls and visited the battlefield as a mechanic on a Red Cross car. He wrote a story of his experiences, but next day found it prudent to remove into Russia.

Hauling a damaged Peugeot car aboard a French truck for delivery to the repair depot



Berliet trucks in French army service with protection for both drivers and motors. Note big tarpaulin cover over driver's head and brushwood and moss on bonnet

Every motorist in France is registered with the police and carries a police driving license bearing his photograph, place of birth, age, residence, etc. This, however, is only a peace time precaution. Such a measure is altogether insufficient when the nation is at war. In Paris and district no man is allowed to travel by automobile until he has secured a special pass from the police. The ordinary pass allows him to travel in the Seine et Oise district, or about 8 miles east of the city and 30 miles in a westerly direction. This pass must be renewed every fortnight, it mentions the number and sometimes the names of the persons who can travel in the car, it is examined by the police every time the driver passes through the gates of Paris, it is called for from time to time on the road, and if used for any other than the area indicated the car may be confiscated.

To travel further afield the motorist must pass through an even finer sieve. Passes are only given for a clearly defined journey, either out only, or out and home. Permission is not given to travel about from point to point. Each application is considered on its merits. If it is for the south, the west, or the southwest, far removed from the army operations, there are few difficulties. But if it is for any part of the army zone, strict inquiry is made first by the civil then by the military authorities, every occupant of the car must be presented and the photograph and signature of each one must appear on the pass.

Gasoline Is Unobtainable

The obtention of a pass for the army zone does not remove the difficulties, for gasoline is inaccessible to all but military motorists within the military territory. Benzol can only be supplied to firms working on army contracts. There does not appear to be any shortage, and if the price has increased it is due to higher freight, but the war department has no intention of carrying gasoline to the front for civilians.

The grip on the non-fighting motorist is extended to the military man. No soldier can take a car out until he has received a written and stamped order from his superior. At the gates to Paris and the entrance to every important city a guard is maintained to examine soldiers' passes. This restriction puts a stop to joy riding and makes it impossible for the military motorist to extend courtesies to his friends.

Engine Balance and Vibration—Part II

Unbalance Caused by Heavy Spots in Flywheel or Crankshaft and Oscillations Due to Lack of Stiffness in Crank or Bearings

By A. Ludlow Clayden

LAST week the explanation was given for vibrations due to the mechanics of engines with pistons and cylinders, vibrations which are inherent with the various types and which we can only hope to reduce by the use of light reciprocating parts or the adoption of multicylinder motors which have all *natural* vibrations of so high a pitch that they are above the sensory range. It was pointed out that the stiffness of the crankshaft had a part to play in that it has to resist forces due to the pistons and is the medium whereby forces due to one piston are enabled to cancel out similar opposite forces due to another. We can now turn to the forces created by the explosion, which do not enter into the matter of the inherent characteristic balance of the type considered in the first part.

Twisting Action on Crank

If we take a long piece of thin steel rod and fix one end in a vise it is possible to twist the free end, if we attach a suitable handle. If one were to try this experiment on a rod with a line drawn along it, then this line would form a spiral.

If we cut the rod in two, refixed the handle and then applied the same twisting force as we had used before, on the long rod, we should find that the remaining portion of the line would take just the same form as it had before the rod had been cut, while the handle had been turned through only half the angle. This is equivalent to saying that the amount a fixed force will twist a rod is in proportion to the length of the rod. Fig. 1 shows the rod with the line on it as it would appear twisted in both the long and the short condition.

Now, a crankshaft is a bent rod which has twisting forces applied to its central parts (the parts which form the bearings). The twist originates from the force of the explosion, which is the same for any cylinder, and the cranks are a series of levers of equal length, but each corresponding to the handle used in Fig. 1 to twist the plain rod. Thus, the length of lever being the same for each piston, and the explosive force the same also, the front piston when on its firing stroke has four times the power of twist production that is possessed by the piston nearest to the flywheel. This means that, if the shaft is weak enough actually to twist with each explosion, it will twist different degrees according to which cylinder is firing. Looking at an automobile crankshaft it seems impossible to imagine that it could ever twist, but the fact remains that much of the trouble in eliminating "periodic vibration" from six-cylinder engines is due to crank twisting. If the crank does twist the piston attached to it is pulled out of place relative to the other pistons. It has been explained before that vibration arises from any displacement of the common center of gravity of all the pistons together (see Fig. 3 page 262 of THE AUTOMOBILE for February 11) and if we have a six-cylinder in theoretically perfect balance, and then move one of the pistons irregularly, we shall upset the whole static system and cause the common center of gravity to move rapidly in a small orbit, so producing vibration of a possibly violent character.

Why Twist Makes Vibration

While this is easy to understand as expressed thus simply, there is another and more potent reason why this twisting should cause vibration and this may be explained by harking back again to Fig. 1. Suppose when the rod has been twisted the handle is released suddenly; then it follows that the rod will not slowly return to the straight state but will go past the straight and twist in the opposite direction oscillating in this manner a good many times before coming to rest. The duration of this oscillation will depend upon the length of the rod, the material of which it is made, the diameter and the degree of original twisting, but the *rapidity* is not affected by the last named. This means that any given rod has a natural period of vibration in twist, just as a tuning fork has a natural period in a crosswise direction. It does not matter how hard one strikes a tuning fork, it gives out the same note, but the severity of the blow affects the length of time that the sounding will continue.

When a crankshaft is deformed by the explosion pressure acting on the piston, as the pressure is removed suddenly towards the end of the stroke, we have reproduced the case of the twisted bar that has the handle let go suddenly. So the crankshaft will oscillate at its natural period, for it cannot very well do otherwise. Now were the shaft alone in the crankcase, the oscillations would not be felt, but since it has the pistons attached to it they are forced to vibrate at a speed corresponding to the crank's natural period and we have seen already that any irregularity of piston movement produces vibrations of an unpleasant character. Suppose again that the speed of the motor and the period of the crankshaft are in tune. We all know that a pendulum has a natural "period" or time of swing, and that to make it swing more and more it is necessary to keep on giving it little pushes at just the right instant. Suppose now that the speed of a motor is such that the firing takes place at time intervals just suitable to the natural period of oscillation of the crank. In such case we have the pendulum illustration reproduced, each successive explosion just "nicks" with the crankshaft oscillation and so tends to make it greater.

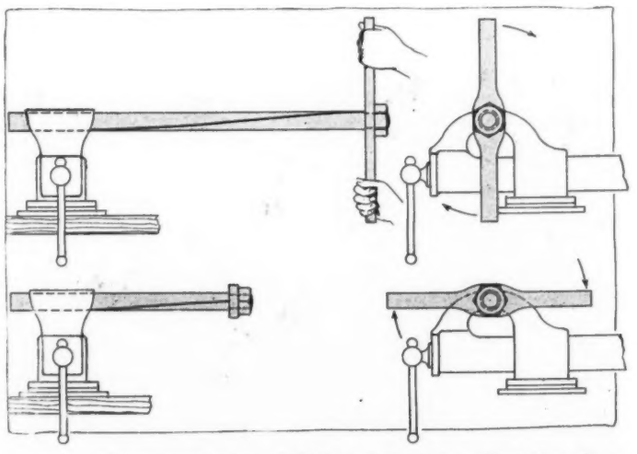


Fig. 1—The amount of twist which a fixed effort will produce in a shaft is in proportion to the length of the shaft. Halve the length and the twist is halved also

Coming back to the pendulum again, we know that if we time our pushes badly the swing may be not only increased, but actually damped out or negatived. Just so with the crank, if we increase the speed of the motor or if we decrease it we get away from the correlation between time of explosion and time of oscillation.

Suppose now that a crankshaft is stiff enough to resist the twisting stress of one explosion under ordinary conditions, it may not be stiff enough at the critical speed when the explosions are all in tune with the natural oscillation period of the crank, and it is this that explains one of the principal reasons why a six-cylinder motor is liable to vibrate quite violently at just one speed but not either above or below that speed.

Damping Torsional Vibration

If it is desired to overcome this vibration period in the speed range of a motor, there is only one thing to do, and that is to make the crankshaft of such a large size that its period of oscillation is well above the maximum possible speed of the motor. To do this requires a shaft of altogether surprising dimensions, which is costly by reason of the material it contains and still more expensive in labor of machining. Vibration at the critical period can be overcome almost completely if we can confine the deformation of the crank to its first twist; if we can prevent the oscillation by causing it to come back *slowly* to the unbent position; as we could prevent oscillation of the rod in Fig. 1 by releasing the handle slowly only letting go altogether when the rod had completely untwisted.

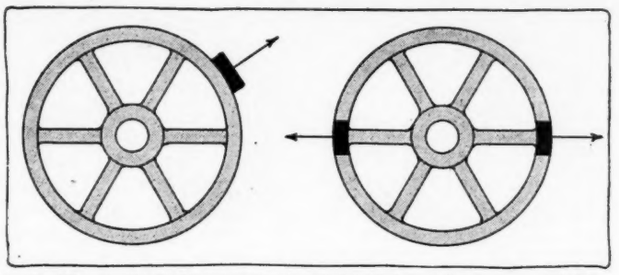
To do this the Lanchester anti-vibrator or vibration damper was invented. This consists of a little flywheel mounted on the front end of the crankshaft having the rim separate from the center and connection made between the two by means of a small plate clutch continuously under pressure. Since the inertia of the flywheel rim causes it to do its best to run at a steady speed it resists any attempt made by the crankshaft to oscillate it rapidly. When a crank is deformed by explosion pressure the inner part of the flywheel slips a little inside the rim, and the energy of the return movement as the pressure on the crank is released is used up in overcoming the friction of the clutch plates. This means that the natural oscillation is damped and the crank brought to its normal position after one or two vibrations instead of after perhaps a few score.

Still, however effective any damping attachment may be, it is unquestionably better to do away with the original bending by means of making the crank sufficiently stiff. The twisting has been considered above as if it were confined to the plain parts of the crankshaft, but actually there are tendencies for the webs to bend and for the crankpins to pull out of straight. These are, however, slight, and if the webs are made in proportion symmetrically with the diameter of the plain parts of the shaft they will be amply strong. Furthermore, it was pointed out last week that a crankshaft required strength against bending to enable the unbalanced couples in a multicylinder motor to balance each other, and if the crank is stiff in torsion it is probably stiff enough in this respect also.

Rotational Balance

It has now been explained how the pistons in an automobile engine can be wholly or partially balanced against each other by *arrangement*, and how that piston balance can be interfered with by irregular movement due to a crank of insufficient strength. Supposing, however, we have a motor in which the reciprocating balance is practically perfect and in which the crankshaft is stiff enough to resist any kind of deformation, it is still possible to find vibration, especially at high speeds if rotary balance is not cared for.

To explain the nature of rotary balance refer to Fig. 2 which shows a wheel with a weight attached to the rim. We



Left—Fig. 2—Centrifugal pull of weight tied to wheel rim. Right—Fig. 3—Balanced pull of equal and opposite parts of rim

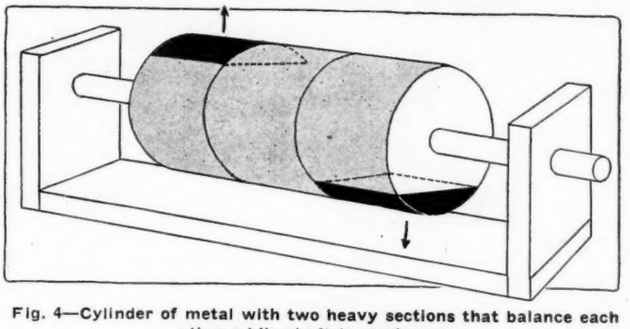


Fig. 4—Cylinder of metal with two heavy sections that balance each other while shaft is stationary

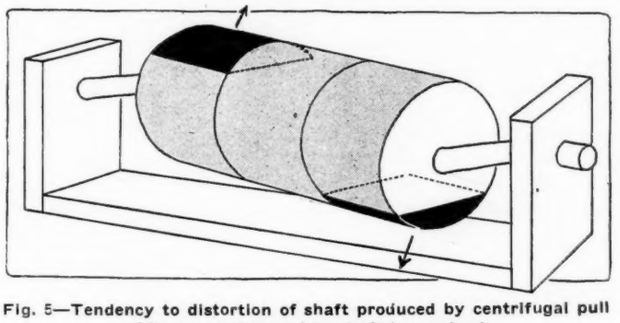
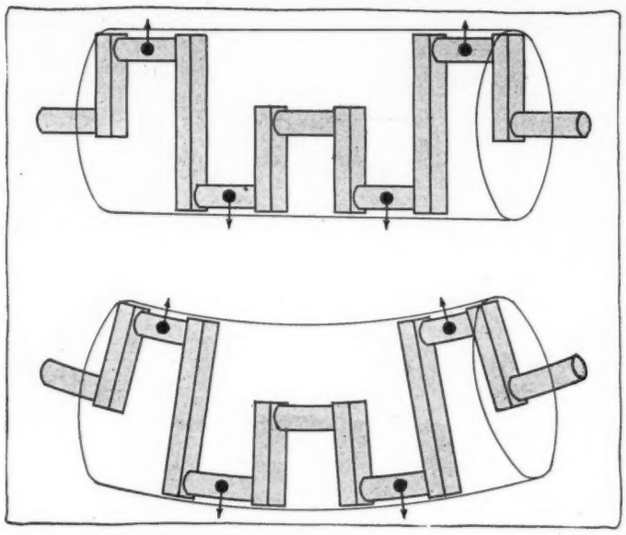


Fig. 5—Tendency to distortion of shaft produced by centrifugal pull of heavy sections when shaft is revolved

know that centrifugal force causes every part of any rotating body to try continuously to fly away in a straight line, that the circular motion is only brought about by the strength of the spokes of a wheel being sufficient to hold the rim together. Now, if a wheel has a plain rim the centrifugal pull of a bit of it; say an arc an inch long, on one side of the center, is balanced exactly by a similar arc on the opposite side (Fig. 3), pulling in the opposite direction. But if one side of the rim is heavier than the other then there will be extra pull on the heavy side and, if we imagine a wheel with a weight tied to it as in Fig. 2, it is easy to see that the centrifugal pull due to this weight will be unbalanced; that is the load due to it will revolve continually around the bearing that supports the shaft. Carry the imagination one stage further and suppose that the bearing was set in a block of rubber, and it is at once obvious that the bearing would wabble as the wheel revolved, the rubber always giving way on the side that the weight was for the instant. Thus, if we have a heavy spot on a rotating wheel, that heavy spot puts an uneven pull on the bearing which can only be resisted by the rigidity of the mounting.

It might easily seem that the flywheel of an automobile motor could not have any heavy spots in it since it is turned from cast iron, which appears to be homogenous material, but it was soon discovered that the density of a casting is so inconstant a quality that flywheels had to be balanced by mounting them on a spindle provided with free bearings, and then drilling small quantities away from the side which tended to always come to the bottom until the wheel would



Upper—Fig. 6—Showing how the weight of the pins of a crank shaft correspond to four heavy spots in a cylinder. Lower—Fig. 7—Effect of the crankpin weights when shaft is revolved tending to bend the shaft into a bow

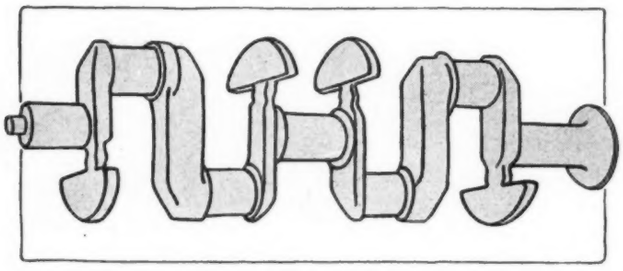


Fig. 8—Crankshaft with balance weights that balance each crankpin in its own plane and so give rotary balance

rest in any position. Even when this is done with great care, however, it is still possible for the wheel to be out of balance when it is spinning. Look at the next illustration, Fig. 4, and suppose we have a cylinder of solid metal mounted on bearings and balanced with the greatest of care. Let us now imagine that the cylinder is made up of several sections; taking three as a convenient number, suppose that the central one is actually homogenous, but suppose that the other two have heavy sides as shown at A and B in Fig. 4. If we mount such a cylinder upon a shaft and then rest the shaft on knife edges (which is the usual way of balancing a flywheel) the two heavy sections will balance each other and the wheel will seem to be perfect. Now, let the same wheel be spun rapidly and each heavy spot will exercise a centrifugal pull, but the two pulls will not balance unless the support is stiff enough to compel them to do so. The natural tendency is for the two centrifugal forces to pull the wheel out of straight, so bending the shaft and producing a state of affairs as sketched in diagram in Fig. 5.

How Flywheels Are Balanced

So far we have avoided the use of any figures, but as it is always difficult to grasp the amount of the forces that can be introduced by this sort of action it will not be out of place to mention that the weight of as little as an ounce on the rim of a flywheel can create a force of a very great many pounds within the limits of automobile engine speeds. All up-to-date automobile manufacturers take care to balance their flywheels rotationally on a special machine wherein the wheel is so mounted that it can actually run out of true. That is, it is allowed to take its natural position of spinning and the amount which this is out of true with the proper position is measured. Small lumps of clay are then added to the flywheel by being stuck inside the rim and a new trial made. When the wheel has been thus weighted until it runs correctly, the bits of clay are removed and a corresponding weight of metal is drilled out from the point in the flywheel opposite to that where the clay had been attached. Really expert men may even dispense with the clay and drill direct but to do so requires a good deal of practice in the use of the balancing machine.

Unbalanced Cranks

So much for flywheels, but the effect of rotational unbalance is also present in crankshafts and it is more serious in one respect, because it cannot be overcome by any simple means. Turn to Fig. 6 and imagine a crankshaft enclosed in a cylinder of a homogenous material. Now we can imagine the two long webs of the crank to balance each other exactly, but imagining the weights of the four crankpins to be concentrated at the four black dots it becomes clear that they do not balance each other rotationally since if we cut up the cylinder into four sections A, B, C and D, A and D are pulling centrifugally one way and sections B and C in the opposite direction. The effect of these unbalanced centrifugal forces is to try to bend the crankshaft into a bow as sketched in Fig. 7. Of course such action is resisted and prevented by the center bearing of the crank but the extra load on this bearing due to this cause alone is often as much as 500 pounds.

It was for this reason that we said in the first part of this article that it was always an advantage to put balance masses on a crankshaft, for we can overcome this bending tendency completely if we balance each crankpin individually. In Fig. 8 the webs are extended so that the weight of the two extensions either side of each crankpin is equal to that of the pin itself and when this is done, each part of the shaft is in perfect balance and the center bearing is relieved of a heavy revolving load.

It is not common automobile practice to take any notice of this rotational unbalance in a crankshaft because it is easy to make the shaft so stiff and the bearing so rigid that the whip in the shaft cannot happen, but it is not easy to make a crankcase so rigid that a revolving load of 500 pounds on the center bearing does not produce some slight vibration, since it is not like a load that is constant in direction. Still, the vibrations arising from the simpler causes are usually so much larger that the lesser ones can be neglected safely, and a shaft that is stiff enough in torsion and stiff enough to resist the static couple dealt with last week, is usually not whippy enough to affect the case perceptibly. It is far more important to see that the pistons and connecting rods are all of exactly the same weight and that the rotational balance of the flywheel is correct.

Conclusions

Vibration is caused by:

1. Impossibility of using designs of motor that enable the reciprocating masses completely to balance each other during every stage of the revolution of the crankshaft.
2. Tendency of the explosion effort to twist the crankshaft so that it becomes unsymmetrical and so pulls a piston or pistons out of symmetry with the others.
3. Tendency of the balanced couples in multicylinder engines to bend the crankshaft.
4. Tendency of the crankshaft to bend by reason of the couples created by its own rotation and its shape.
5. Tendency to wabble the flywheel caused by heavy spots in the metal of which it is composed.

It is only the first of these things that is capable of exact mathematical determination and the others are all matters of compromise but it is significant that three of the five conditions are met best by the use of a very heavy crankshaft.

The natural smoothness of the six-cylinder due to its premier position in static balance can only be taken advantage of by the use of a shaft that overcomes the twisting and bending forces, and it is easily possible for a four-cylinder motor to have less vibration than a six. The eight has the advantages of the four and not all the disadvantages of the six, and the eight with cranks set at 90 degrees as shown in Fig. 7 last week, appears to have all the advantages of the four and most of the advantages of the six.

There is one point in balance and vibration that has not been touched upon except in passing, and this is regularity or otherwise of torque or driving effort. With each explosion the speed of revolution of the flywheel receives a momentary acceleration and this speed slowly falls off till the occurrence of the next explosion. If we draw a curve to represent these accelerations and decelerations it will constantly cross the straight base line representing a steady revolution speed. The greater the number of cylinders the more closely will the curve approximate to the straight line. Now each time there is an explosion the flywheel driving effort is accompanied by a corresponding recoil, which means that the motor tends to turn as a whole in a direction opposite to that of the flywheel. At slow speed this effort may make itself felt by the motor giving a little kick in the frame with each explosion, but the effect vanishes as the speed rises and the kicks become merged in a continuous push. The even torque of the six and the still better torque of the eight are thus most advantageous at low speeds; as revolutions go up the four is not noticeably inferior. The reason for mentioning this is that if the problem of providing an automobile with a motor to drive it is regarded from a first-principle point of view, there are reasons for and against every kind of cylinder number and arrangement. If our choice is limited by the amount of money available for the motor then there are several reasons why a well-made four might prove more satisfactory to the user than a poorly made six or eight. Neither the four, the six or the eight has all the advantages from a smoothness viewpoint; it is a question of give and take and it is likely for this reason, if for none other, that we shall see all three kinds of motor continuing to exist.

New Russel Internal Gear Drive Axle

Detroit Concern Develops Type for 1-Ton Trucks

NOTING the strength and weakness of the various rear drive systems now in use, the Russel Motor Axle Co., Detroit, Mich., has spent over a year on the development of an internal gear drive rear axle for 1-ton trucks. Its entire attention has been devoted to this type, and the concern is now in position to supply the design commercially.

The internal gear drive principle is not new, but there is no doubt that some of its advantages have been overlooked until the present time, when much attention is being devoted to it, and several truck makers have adopted it as standard.

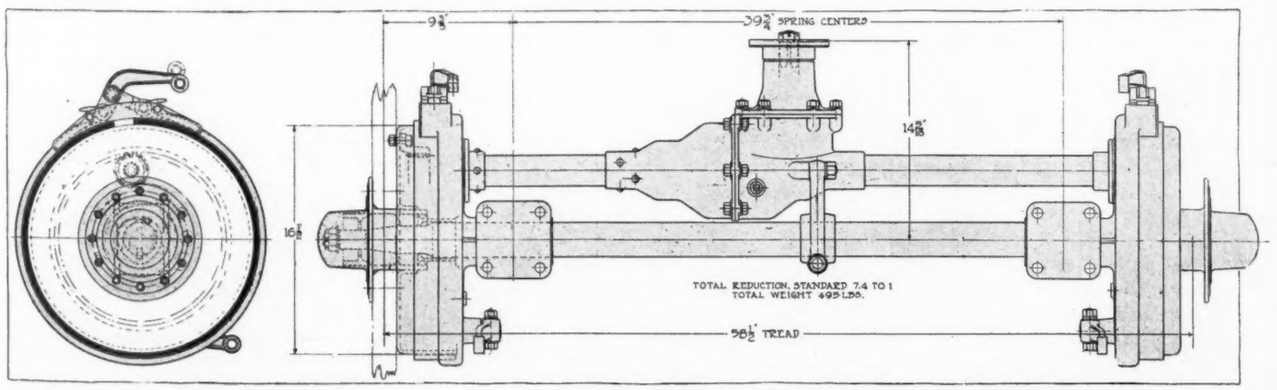
The Russel construction is shown in the illustration. The unit combines a forged steel fixed axle which carries the load with a light, high-speed jackshaft, driving direct through pinions and internal gears attached to the road wheel hubs. The driving member is ahead of the dead, load-carrying axle, and all driving parts are inclosed.

The driveshaft runs directly back from the gearset in the usual way, and connects to the driving member. In this member there is a differential unit, each axle shaft running out to a pinion in mesh with the internal gear attached to the wheel drum, which in turn connects to the spokes of the wheel.

An advantage of the construction is in the small permissible diameter of the bevel ring gear which carries the differential gears. The use of pinions and gears at the wheels obviously admits of any desired gear reduction at this point rather than at the bevel gear, and hence the latter may be made of a size which gives almost a 1 to 1 ratio. This makes the housing for the differential gearing very small with consequent minimum weight and compactness. In the standard Russel type, the total reduction is 7.4 to 1 between propeller shaft and wheels, most of this coming at the wheels. The total weight of the axle is 495 pounds.

Directory of Piston Ring Sizes

The Burd High Compression Ring Co., Rockford, Ill., has issued a pamphlet in which the size ring for practically every make of automobile, motorcycle and truck is given. The pamphlet which is paper-bound and measuring 4.5 by 6.7 inches contains sixty-seven pages of piston ring information. Following a ten-page dissertation on the requirements of piston rings, there is a tabulation of sixty pages in which the different makes of motor are listed under the piston ring sizes. The remainder of the booklet is taken up by an index under which the car and motor makes are listed under their names. Thus if it is desired to determine to find the size rings in a Ford T, for instance, Ford is listed in the index as being on page 13. Turning to this page it is found that the Ford is listed under cars with 3.75 by .25 rings. Another column tells us that there are three rings to a piston. Remaining columns on each page enable the dealer in piston rings to keep a record of his stock.



Russel internal gear drive axle for 1-ton trucks. At the left is a diagram showing the operation of the internal gear which imparts the drive through the wheel hub. At the right is a plan view of the system, showing driving member mounted ahead of dead axle and connections to hubs, etc.

Silent Chain Drives on Increase

Motor Makers Use Wider Face Than Formerly—Advantages and Difficulties in Their Construction

OPPORTUNITY for a summary of the varied installations of silent chains in American automobile motors was afforded by the year's national automobile shows. Representative uses of this method of drive are all grouped together in an exhibition of this kind; therefore a better means of comparing them could not be obtained. With one installation and its advantages and disadvantages clearly in mind, a few steps brought one into contact with another before the previous ones could become indistinct in his memory.

Some typical methods of using chains are shown diagrammatically herewith, and they indicate that the uses of chains are many and varied and that the problems connected with each case are comparable in no way with those encountered in another. Different center distances and uses bring different demands for adjustment or require none. One oiling system will make a certain means of getting the oil to the chain and its sprockets a very feasible proposition, while another will make that oiling scheme impractical and call for another.

It is encouraging, however, to see the generally increasing use of silent chain drives in American motors, for the design is unquestionably most meritorious when properly worked out. It is a more costly construction than gears, although it not only admits of greater flexibility as regards the placing of certain units, due to the permissible variation in center distances where gear centers are fixed, but, in the average case, because a greater number of chain teeth than gear teeth are in mesh at one time and because chain flexibility allows for easy engagement of its teeth with the sprockets, chains are usually more silent than gears when properly installed.

Factors to Be Considered

Chain makers seem to agree that there are a number of considerations which must be properly satisfied in order to insure a satisfactory installation. Chain width, adjustment, oiling, speed, number of teeth, center distances and so on must be given their correct attention.

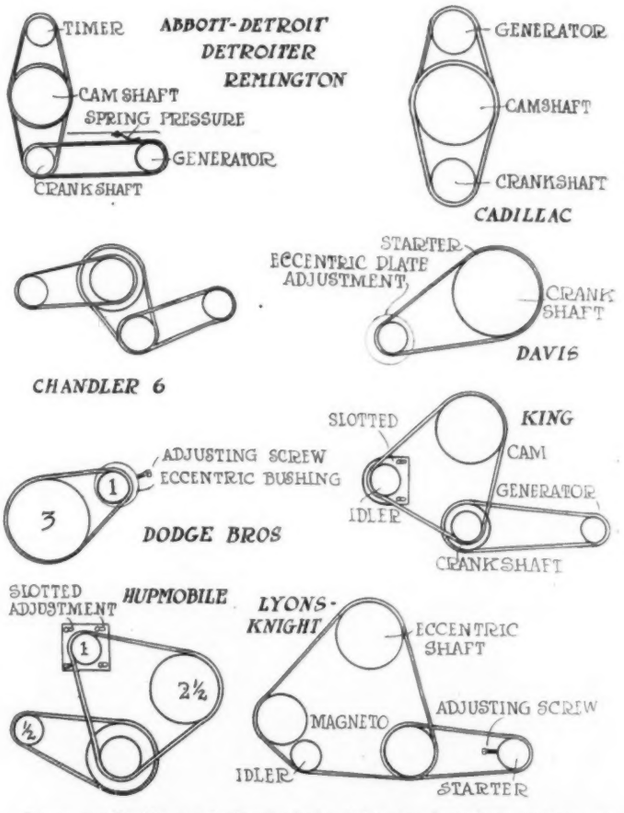
One of the most common mistakes made in the past in the use of chains is that they have not been wide enough for the particular service required. This mistake does not appear to have crept into the drives at present used. The drive of a camshaft or generator is peculiar in that the operative speed of the chain is high, while at the same time its length is short as compared with the average drive. Hence it requires a good bearing surface, and this is accomplished by increasing the width over that required of a gear train.

The oiling of chains is an important consideration, for like any other machinery, proper lubrication reduces wear and increases the efficiency of transmission. This is one reason why an inclosed chain is superior to open designs. The latter do not admit of proper running in oil, and a humming or singing at speed is almost bound to result. Where pressure feed is used, a common method of introducing oil to the chain cases is by a pipe which directs a stream of lubricant onto the *inside* of the chain. This carries it around and distributes it to the various surfaces in contact in a very satisfactory manner. A point must be immediately made, however, of the fact that it is bad practice to allow the stream of oil from such a lead to play upon the *outside* of the chain. In its rapid motion, such placing of the oil is very unsatisfactory due to the centrifugal action tending to throw it off from the chain and sprockets, splashing it against the inside of the gearcase, and preventing it from performing its function. Splash oiling has the advantage of simplicity.

Preventing Whip

There has been considerable argument among chain users as to whether a means of adjustment of the sprocket centers is advisable and the consensus of opinion of the makers of chains seems to be that wherever possible some means of taking up any play in the chains should be provided. Whipping, which is a natural consequence of looseness in a chain, is apt to break the chain in time, and there is only one way of removing such looseness. That is by means of lengthening the center distances, however little.

Where the chain is used for ignition or camshaft drive, any slackness is apt to make inaccuracies in the valve timing and the ignition timing. With adjustment in the average case an easy thing to provide for, it seems foolish to sacrifice its benefits, and most designers have recognized the fact to the extent of making it a comparatively simple matter to



Some applications of silent chain drive to American motors as seen at the national automobile shows. Some cases are found where the driven sprocket may be moved slightly by inserting shims between the fixed portion of the chain case and the movable part carrying the sprocket

take up any looseness, even without removing the chain case cover. On drives where the sprockets are very close together, and there is very little of the chain free, whipping is obviously reduced, and the necessity of adjustment is less than where there is considerable free length. It is advisable, however, where adjustment is not feasible and desirable that the chain be made as wide as possible, thus bringing in as much inertia effect as is admissible to combat the tendency to whipping. Wear is also less with the greater contact width, which reduces the need of adjustment.

The diagrams indicate the various means of adjustment as practiced in most American engines. Some cases are found where the driven sprocket may be moved slightly by inserting shims of varying thickness between the fixed portion of the chain case and the part carrying the sprocket, which part may be moved. The Chandler and the Golden, Belknap & Swartz motor are good examples of this scheme.

A very popular and simple means of adjustment externally is by means of slots in the base plate of generator or other driven unit so that it may be moved along with its shaft on its base, and thus slightly change the position of the driven sprocket. Nuts hold the unit in these slots, and it is usually only a matter of loosening these, sliding the unit along on its support and then tightening the nuts again. Such means of taking up wear are found on the Overland, Metz and Hupmobile among others.

The Eccentric Bushing

The eccentric bushing on which the driven sprocket shaft is carried is also a very simple means of varying the center distances. By holding this eccentric design in position by some form of set screw, it insures a positive means of positioning. To take up wear it is only necessary to loosen the set screw, when the eccentric may be turned to accomplish the desired degree of center changing. The Marmon, Dodge and Davis come under this head.

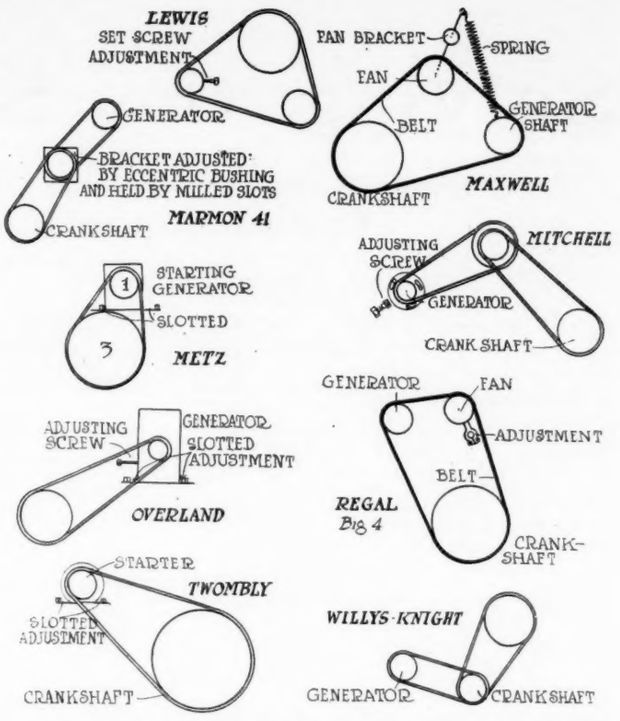
Idlers are often used as a means of taking up slackness in chains, they being so mounted as to admit of moving them outward from the inner side of the chain. It usually means removing the chain cover to get at such a means of adjustment. Chain makers caution designers not to use idlers unless they can be fitted so as to have at least 100 degrees of contact with the chain. The King eight-cylinder motor shows a good example of this idler form. The idler sprocket is mounted on a slotted plate, which may be moved after loosening the nuts.

Another form of construction is that in which the driven sprocket itself may be turned with respect to its shaft by means of milled slots in its web. In these slots are bolts attached to a plate which is fixed with relation to the shaft. This has the disadvantage that when the sprocket is turned, the drive side is tightened right enough but the following side is made so much the looser. The center distances remain fixed, which means that the slack has to come somewhere in the length of the chain.

Some installations have adopted a means of keeping the following side of the chain free from whipping by using a flat form of idler which has a fiber face bearing against the back of the chain. In the new Massnick-Phipps eight this idler design is modified to the extent of using a flat steel spring against the back of the chain instead of a fiber-faced piece. When such a position for taking up slack is employed, only some form of flat idler should be employed. Any form of round pulley design is not advised.

Chains of the silent type are advantageous further because they can be used at comparatively high speed with satisfaction. Makers state that any speed up to about 1,200 to 1,400 feet per minute is permissible, though there are instances where 1,800 feet has been considered good practice where oiling is properly taken care of.

One point which should not be overlooked in designing a



Another group of diagrams showing various means of adjustment. A popular and simple method is by means of slots in the base plate of the generator or other driven unit, so that it may be moved along on its base and thus slightly change the position of the driven sprocket

chain drive for least wear is the use of sprockets which are so related to each other that one has an even number of teeth while the other has an odd number. That is, if one wheel has eighteen teeth and the other thirty-six teeth, there will be unequal wear because the same combination of links of the chain will come into action with the same teeth of the sprockets each time around. To avoid this and to cause even distribution of the wear, one sprocket should have, say, twenty-one teeth while the other has forty-two teeth; or nineteen and thirty-eight; seventeen and thirty-four, and so on.

One chain maker in particular, the American High Speed Chain Co., advises that on camshaft drives, pinions of not less than seventeen teeth should be used. Nineteen or twenty-one teeth are preferable as they give better action and tend to longer life. On generator and starter drives this same company states that thirteen and fifteen tooth wheels are permissible.

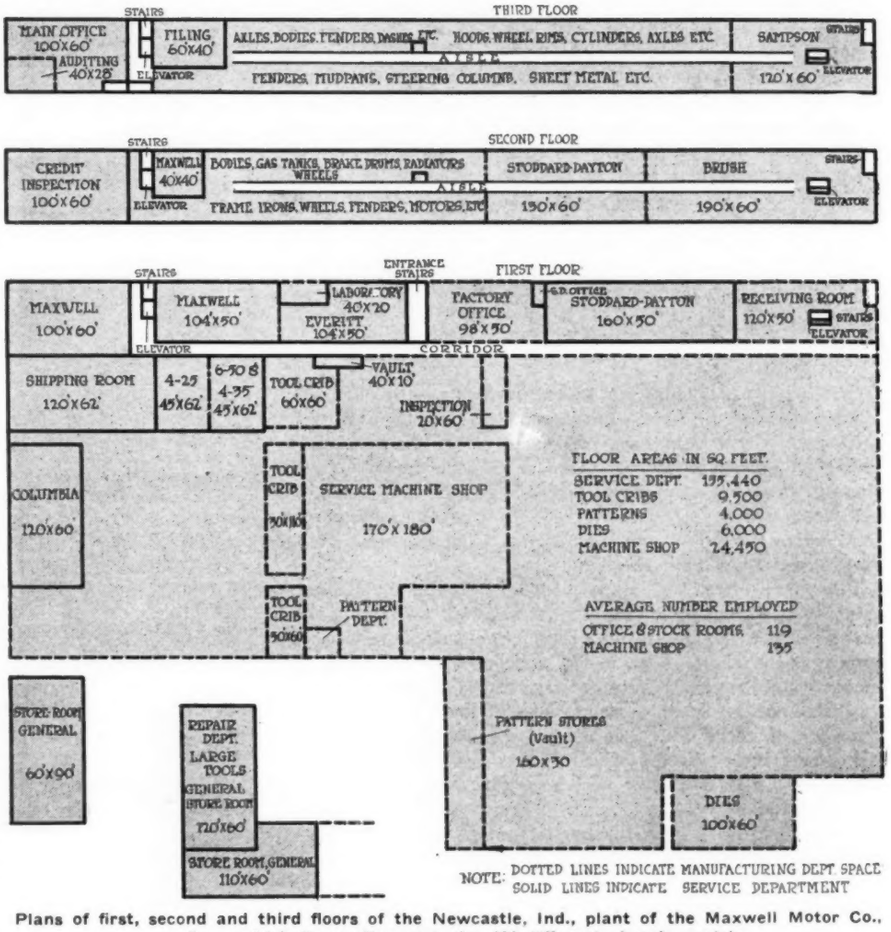
Chain makers as a rule have fixed relations between the center to center distances, pitches, and number of teeth in the sprockets. Supposing the ratio of the two wheels to be required two to one. There are several sizes of wheels that can be used to attain this ratio, but they have to be designed to meet the sizes which the chain maker recommends. If the sprockets can be made of a size to admit of one having twenty-one teeth and the other forty-two, then with a 1-2-inch pitch, the center distances could be any of a list of from ten to twenty-five dimensions. For a total chain length of 70 pitches, say, the center distance would be 9.475 inches. If the designer desired to have a distance between centers of about 10 inches with sprockets of the above-mentioned size, he would find that the closest he could come to it with a 1-2 inch pitch chain would be either 9.981 inches, or 10.49 inches, these giving chains of 72 and 74 pitches, respectively. Therefore, the designer cannot arbitrarily say his center distances are to be a certain amount. They must come as near to that required distance as the chain requirements will allow.

Solving the Spares Problem

Centralized System Supplying Used Car Parts Shows Efficiency—Prompt Supply and Reasonable Charges Insured by Systematized Control

THERE comes a time in the history of every automobile when the service department of the company which built it must be called upon to furnish replacement parts or equipment, and much of the machine's ultimate value to the owner depends upon the efficiency and promptness with which these can be obtained when needed. As the motor car buying public grows wiser, it becomes harder for the concern with no well-organized spare parts department to sell its cars. The buyer investigates that end of it nearly as carefully as he does the mechanism and appearance of the vehicle he is about to purchase, knowing what it means to break a spring or strip a gear and then have to wait several weeks for a new one to arrive from the factory.

It may safely be said that up to a few years ago many of the automobile makers were too busy selling their automobiles in the first place to worry about replacement parts for old cars, but today, the majority of those who have built the foundations of permanent organizations realize the great advantage of keeping their cars sold. It means much to a car owner to know that should he break an axle shaft he can have another one by express, as the result of a wire order, within 2 or 3 days. It usually means that the next time he is in the market for a new car, he will get one of the same make, for he realizes that he is buying service as well as machinery.



Plans of first, second and third floors of the Newcastle, Ind., plant of the Maxwell Motor Co., from which it supplies parts for 164 different chassis models

Thus it has come to be the rule with the bigger makers to have a carefully planned system of filling parts orders with the greatest haste. To do this it is necessary constantly to have on hand a fairly large stock of parts for every model which the factory has built, for if it were necessary to make an obsolete part after the order came in, the anxiously waiting car owner would soon give up in disgust and make up his mind that it would do no good to buy even a current model of that concern's make, for it would one day be obsolete and he might then experience the same trouble in getting parts for it that he is now experiencing in securing them for his 1907 model.

Fully aware of all of the advantages of an efficient service organization, the Maxwell company, in taking over the property of the bankrupt United States Motor Co. some 2 years ago was confronted with the problem of how best to build up a service department which could efficiently serve the owners of all of the different makes and models for which the parent company had been responsible. There were nine different cars. Stoddard-Dayton, Maxwell, Columbia, Everitt, Brush, Courier, Sampson, Alden-Sampson truck, and Courier Claremont, which latter was at one time a part of the Brush plant's output. Nearly all these companies had made a number of different models in its time. The first Maxwell was a two-cylinder runabout constructed in 1905, and the last a 1913 40-horsepower touring car. Similarly, the first Columbia was an 1896 creation in the form of an electric stanhope; the last a Knight-motored car of six cylinders made for the 1913 market. The same applies to the other makes, so that, taking the stock models of all the companies, there were in all 164 different chassis for which the U. S. Motors Co. had been attempting to supply parts when the Maxwell company took the reins.

Why Plant Was Founded

It is estimated that this number meant the total number of parts to be kept on hand was 146,000. No small task this,

particularly as the Maxwell company was under no legal obligation to take care of the owners of all these models when it bought the assets of the defunct concern. At this time there were 122,000 of these cars of various types and models on the road, and it meant that, if the Maxwell company did not take care of them, the spare parts business would have to be turned over to a concern making a regular business of supplying parts for old cars. This would put the whole 122,000 owners at the mercy of a parts concern which could exact any prices it might be able to get, a far from desirable condition of affairs.

But the Maxwell company felt that had there been no way for these owners to obtain replacement parts, the second hand value of their machines would have been cut to a very low level. Realizing this, and recognizing the value of such an investment in good will, the concern took steps to concentrate the parts for all of these 164 models under one roof. It was a herculean task and it required months to bring the thousands of parts to the one point—Newcastle, Ind. Here the Maxwell company inherited the plants which the Maxwell-Briscoe company had used for making its cars. The geographical position being central, and the plants being best adapted to such a parts station as was required, led to the decision; and to the ultimate investment of $2,000,000 here in the conversion from a strictly manufacturing proposition into a combination manufacturing and storage plant where literally miles of bins and piles of parts are now kept in readiness to answer to the hurry calls from owners in all parts of the country.

Order Out of Chaos

The history of the troubles which the new Maxwell company had in establishing this service center have been told before in these columns. How the stocks of parts which the U. S. Motors Co. dealers had carried in different parts of the country were all shipped to Newcastle, how it took months to sort, index and identify them, has been explained. It was discouraging to those to whom the work was entrusted, but finally came order out of chaos and by the close of 1913, J. E. Burns, Superintendent of Service, and his staff, had accomplished the difficult task and had in running shape a well-ordered service department with a stock of parts for each one of the 164 models.

A Complicated Task

The drawings, jigs, tools and dies for the multitude of parts were scattered in different parts of the country, and these had to be brought to the Indiana plant in order to make up a supply of certain pieces for which there was sure to be a call later on. Many drawings were missing, many could not be identified properly, and it took the best efforts of men brought from each of the old factories, who were familiar with the parts of their cars, to determine just what many parts were, and for what model. Some of the old firm's stock inventories and records were incorrect and, considering everything, the task could scarcely have been more complicated.

Today, if you order a right rear fender for a 1908 model K Stoddard-Dayton, or a front axle for a Brush runabout, it will be shipped to you not later than 48 hours after the order is received at Newcastle. You can get these parts for obsolete models just as quickly as any of the parts for the present Maxwell 25, now being manufactured, and the service business of which has just been transferred to the main service plant, along with the rest.

How Ordering Is Simplified

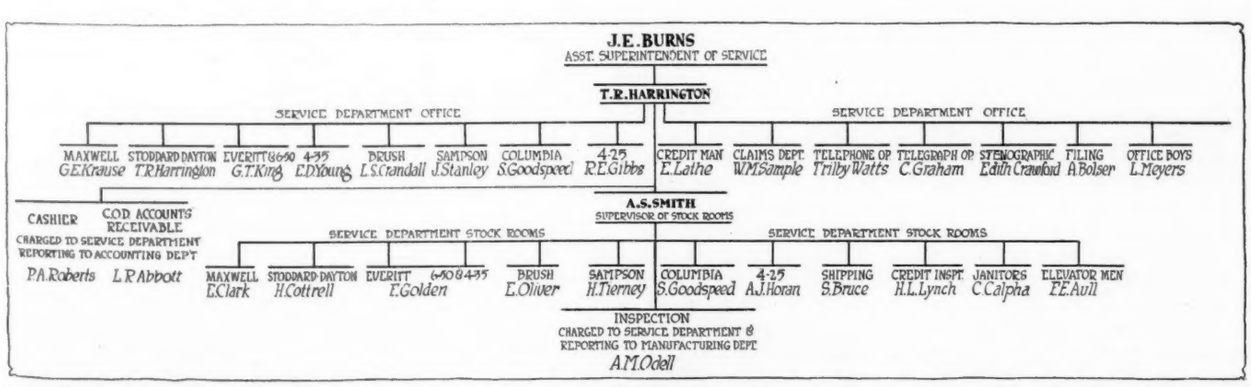
The Maxwell Newcastle plant is strictly a factory which makes a business of selling parts for cars. It may be likened to any of the great mail order houses. Its stock in trade is parts for cars in service and its special machine shops are concerned principally in keeping that stock up. Under the name of the Maxwell Motor Sales Corp., it is simply a unit of the Maxwell organization, only instead of selling cars it sells parts. It must show its own profits and has its own organization.

Like a mail order house, a catalog plays an important part, though it is not called a catalog, but is known as the dealers' master parts price list. It is unquestionably the largest parts price list ever issued in the automobile industry, with 417 pages enumerating every part of every model of each of the nine makes of ears already mentioned. Its size and thickness make it resemble a big city telephone directory, and it is the dealers' handy reference. It gives the list price of each part, the part number and so on. All models of any one make are segregated into one section of the master book and are printed on a different color of paper from the rest, so it is a simple matter to ascertain the number and the price of any desired part.

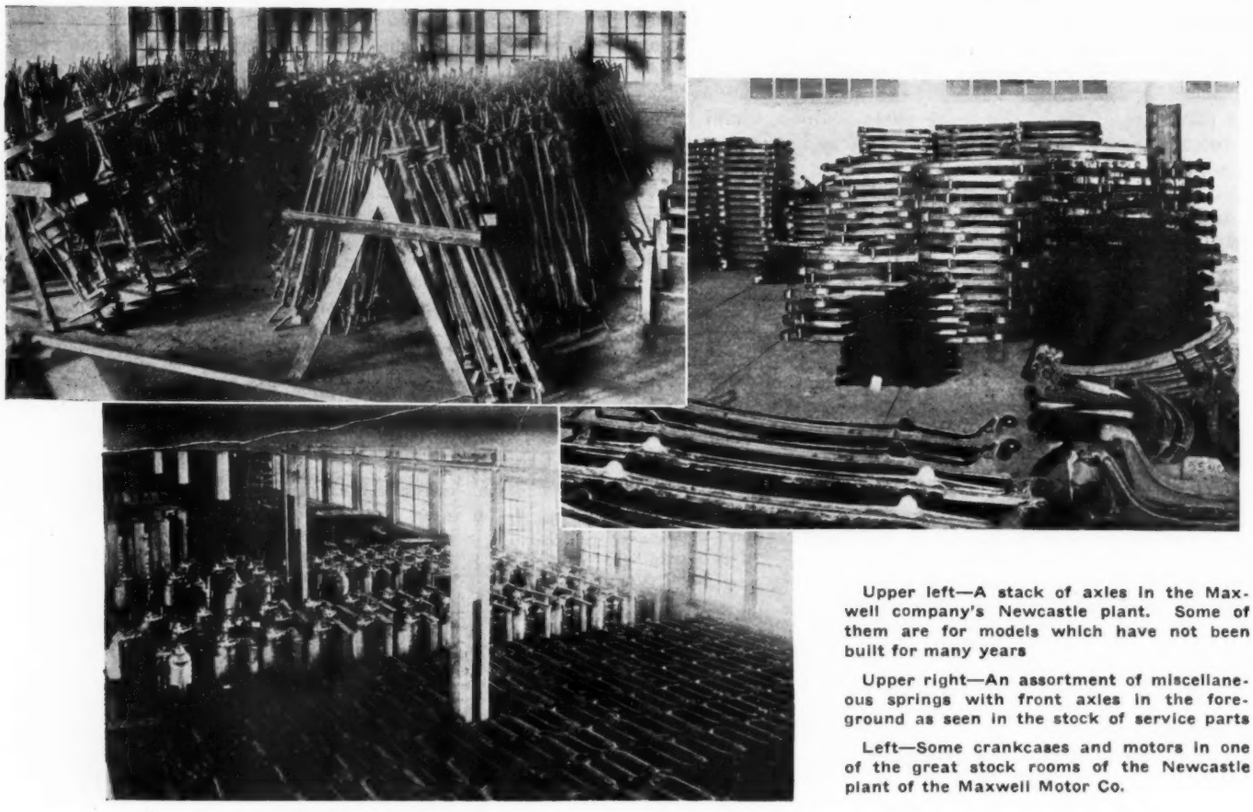
This master price list did not come until after the Newcastle plant had everything sorted out and inventoried and, as it has recently come off the press, after months of preparation in order to weed out duplications, check the parts numbers for accuracy and so on. The book has been given wide distribution, the idea being to place one in the hands of every dealer so that, should he be called upon to repair one of the makes of cars for which the Maxwell company is sponsor, he will know where to look for parts. Thus the book is valuable not only to the Maxwell dealer but to other garage men as well. Of course, every garage man and dealer gets the regular discounts of a trade transaction.

Organization of Plant

The total floor space at Newcastle is about 650,000 square feet, of which 155,000 is occupied by the service department proper and the balance given over to the manufacturing



System of organization worked out for Newcastle plant of the Maxwell Motor Co., which supplies parts for all old models of the U. S. Motors Co.



Upper left—A stack of axles in the Maxwell company's Newcastle plant. Some of them are for models which have not been built for many years

Upper right—An assortment of miscellaneous springs with front axles in the foreground as seen in the stock of service parts

Left—Some crankcases and motors in one of the great stock rooms of the Newcastle plant of the Maxwell Motor Co.

division. The main building, in which the majority of the bins of parts and racks for larger articles are located, is 722 feet long by 60 feet wide and three stories high. Behind and adjoining is the machine shop, which has a saw-tooth roof and is 500 feet long by from 250 to 400 feet wide. Also behind the main building and parallel to the big machine shop is a forge department with thirty-two hammers, this doing all the forging for the present Maxwell car.

In a portion of the rear building is the shipping department, 120 by 63 feet, and also storage for Columbia and Maxwell models 45 and 62. Other supplementary departments consist of the power house with its big Allis-Chalmers direct-connected steam engine and generator and turbine and generator; the testing laboratory in which samples of each heat number in each shipment of materials to the manufacturing department is analyzed to determine whether or not it comes up to specifications; the vaults in which the patterns and blue prints of parts are kept, and the store houses.

The service department employs about 300 men in its various divisions, these being in two main groups; those directly under the supervision of the administrative heads, and those directly answerable to the supervisor of the stock rooms. The latter reports to the service superintendent along with the other divisions, however.

The scheme of organization is, in the main, to have a certain corps of employees to handle the orders and service parts of each make, or group of makes, of cars. To this end, the office force is divided into sections, these turning their orders over to a part of the stockroom force which deals exclusively with parts of that make or makes of cars. For instance, there is a group of office men to which orders for Everitt parts are given: they determine just what parts are required and have been chosen for Everitt work because of their former connection with that make of machine—either on the service or manufacturing sides. In the stockroom another set of men also familiar with the same car are employed.

This scheme gives most efficient service in the handling of orders. Men who have had long experience with the construction of any one make of car are naturally best adapted to filling orders for its parts and, when an order comes in which is not very clear the value of this experience is apparent. Anyone would know what is meant when the part number is specified, but in cases where the customer does not know the number and orders by description, the experienced man must determine what is required and enter the proper part number on the order which goes to the stockroom. To get these experienced men the company had to scour the country for former employees of the different plants.

Stockroom Organization

The stock rooms are arranged to segregate all of the parts of any one make of car in one part so far as possible. However, some of the larger parts such as radiators, fenders and so on, are put together, since they require special racks and it would not be feasible to have a few of them in each make's particular section. This segregation applies specially to the bins of small parts. For instance, one division looks after the filling of orders for Sampson trucks and for all makes of radiators and fenders. Two men who know the difference in construction of the various radiators used by the nine makes of cars handle this division. They know if a certain radiator ordered is interchangeable with that used on another make, and which would be the best to send.

Order Record System

The order and record system is simple, direct and efficient. Starting with the coming of the mail to the plant, each letter is consigned to a compartment of the mailing desk, this corresponding to the division men who will handle the order. Having passed through the hands of the credit man, who determines whether to send c.o.d. or charge, the order goes to the special division men who indicate just what part number it is and otherwise check it to see that it can be filled intelligently with the information at hand.

Suppose a front spring bolt for a model 40 Maxwell is ordered and that the order does not specify the part number. The division dealing with the Maxwell 40 gets the letter and, looking in the master parts book, finds this to be part No. 17,805. This is indicated on the letter, which is then turned over to the stenographic department where the order is transferred to a shipping order. This is on 8 by 10 paper and is made out in five copies, the white original, the yellow office copy, pink stock room copy, buff shipping department copy and the blue acknowledgment, which is shown herewith.

Having been entered in quintuple on the regular forms, these stenographic copies are checked by the division clerk against the original letter. Finding that No. 17,805 is correctly entered on the forms, the acknowledgment is immediately sent to the customer by mail. The pink stock room copy, the white original and the buff shipping copy then go down a chute to the parts office handling Maxwell 40. Here they are time-stamped, and a clerk refers to a card index which has for its reference number the part No. 17,805. On this card is indicated in what bin number the spring bolt will be found. This is entered on the three copies of the order, which are then turned over to a stock boy. He goes to the bin indicated, secures the bolt and after inspecting it, sends it to the shipping room along with the buff-colored and white copies, the pink one being filed in the parts office file. The time stamp also indicates when the bolt was turned over to the shipping department.

Having wrapped the bolt for shipment, this department weighs it and indicates the weight, together with the classification, on the white copy. The buff copy is packed with the bolt and goes to the customer, and the white copy then goes to the office where the charge for the shipping is entered, and the total charge is figured. If the bolt goes c.o.d., these charges are entered and the original sent back to the shipping department, giving it instructions as to how much must be collected at the receiving end; if it is to be charged, this instruction comes back to the shipping department. Having completely cared for the bolt in either case, the shipping clerk time stamps the white copy and sends it back to the office for billing and filing purposes. Inasmuch as the yellow office copy is filed with correspondence from the customer, a cross index of the transaction is afforded when the white original finally gets into the files. At any future time, the office can learn from this just when the part was shipped, how shipped, who checked it, who filled the order in the stockroom and so on.

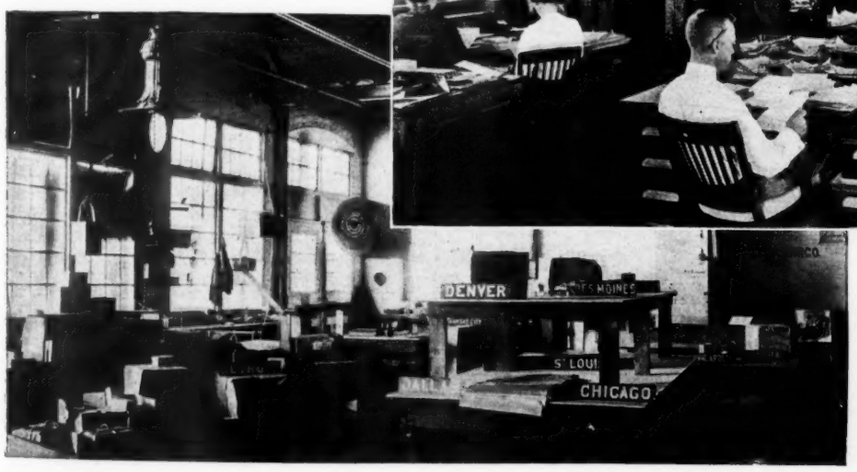
In using these five copies, a series of symbols are employed, these prefixing the order number and referring to the make of car. For instance, an order for obsolete Maxwell parts goes on a form having N.M prefixing the number. Brush parts have N.B as a prefix, Maxwell 6-50 has N.F, Everitt N.E, and so on. Thus if any reference is made to order No. N.B 23675, the filing department knows immediately that it deals with Brush business and goes to the Brush files for the No. 23,675; when it is considered that there are some 150,000 live parts orders, the advantage of this system will be readily apparent.

In connection with the stockrooms, a perpetual inventory of parts on hand is kept. This is done by bin cards which show at any time how many parts are on hand, in addition to indicating on what order numbers any of them were taken out. When a part is removed from a bin, the clerk notes this on the bin card, and also subtracts from the total, bringing the inventory up to date at all times. Each stock keeper has a minimum stock quantity record and, when the quantity of a certain part reaches this minimum, an order for a fresh supply is placed with the supervisor of stock. This is referred to the superintendent and, if the part is one for which he deems it advisable to issue a manufacturing order, he sets the machinery in motion for replenishing the supply.

Credit for Unused Parts

The credit inspection department is a division which has an important work to perform. To it go, immediately on receipt, parts which the customer claims are defective, or any which have been sent in as samples for duplication. It is the duty of this department to examine claimed defects and to pass upon them, making out proper credit slips. If the inspection reveals that the part is good, it is put back into stock. Frequently a customer will return a part for credit which he had ordered with the intention of using, but later found that he did not want it, and the credit department must assure itself that such returned parts are not defective. Or, if it is the case of a sample sent for duplication, this is identified and a correct shipping order made out for it which then goes through the regular procedure.

If a part comes to this credit inspection department without explanation, a report slip for the office is made out notifying its arrival. At the office, correspondence relative to it is looked up, and proper disposition instructions issued to the credit inspection division. In this department there is a



Above—A view of the correspondence department of the Newcastle plant where letters from owners of old models in need of parts, etc., are handled

Left—Some shipments of a day ready for the express companies. The work is facilitated by placing packages for any one large center in one pile so that sorting will be simplified

series of bins which are used for storing parts held for disposition instructions, and the bin in which any part is stored temporarily is indicated on the report slips, so that anyone can find it immediately should it be required.

With this comprehensive system, thousands of parts are shipped, or ready for shipment within an hour from the time received. Twenty-four hour service is the rule and, if a part cannot be shipped in that time, a letter of explanation is written to the customer. Occasionally there will be parts shortages over which the plant has no control. For example, suppose a steering spindle for a 1906 car is required. It might be that for 2 or 3 years only one or two of these has been called for, but orders may come in suddenly to the tune of ten or twenty, from all parts of the country. As this demand could not be foreseen, the plant has not looked for any such requirement and probably has not the number needed to supply all the orders. Then the factory writes telling the customer of the delay and why.

It makes a definite promise as to when the part will have been made and when it will be shipped, and it is a hard and fast rule that a part must go forward immediately when promised in cases of delay of this kind. This is done by means of stock chasers who get promises from each of the departments concerned in the production of the part and by figuring out the time each will be through with its part, can say definitely when shipment can be made. The departments are made to adhere to these promises, or they must give a good reason why. The manufacturing department, however, cooperates with the service department to satisfy the customer. It is obvious if the customer knows when to expect a part delayed in shipment he can make plans accordingly and feels better toward the company than if delays happened and there was no definite time set or reason given for them. However, the delay cases are said to be only 5 per cent. of the great mass of orders going ahead at all times.

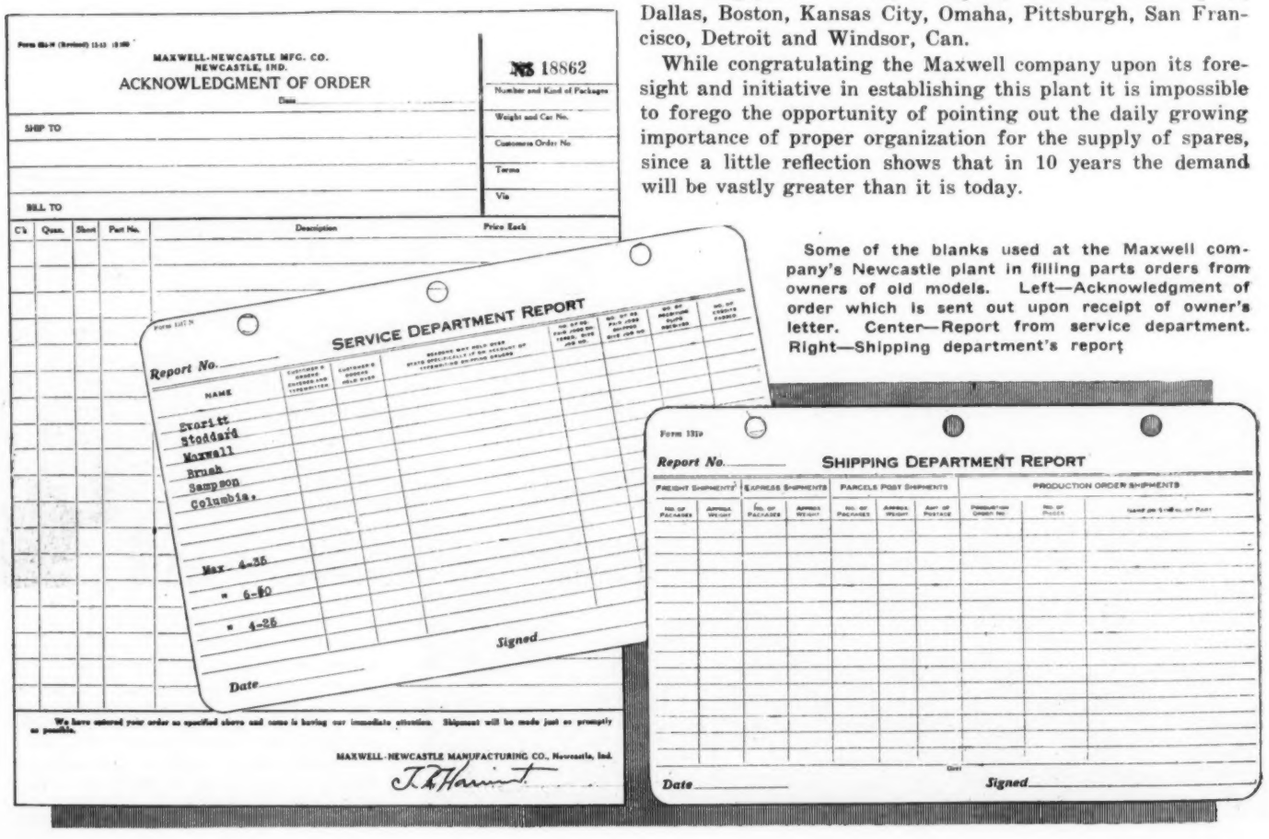
The shipping end of the Newcastle organization includes a traffic department which aids customers in routing shipments and tracing those which go astray. It runs down reasons for refusals of delivery and acts to get parts transported most expeditiously. Sometimes a customer orders a part sent by express when parcel post would be cheaper and vice versa, and the department looks into each case before letting it go out. An effort is made to get parts through as cheaply and at the same time as quickly as possible. Small shipments are made by express or parcel post and, as there are three express companies and three leading railroads serving the city, this makes facilities for prompt shipment ideal.

On an average day 600 to 800 parcels go forward, but since the Maxwell 25 parts have been taken to Newcastle also, it is expected that the shipments will increase to about 1000 per day. In an average week of the busy season last year the number of orders was 3500, of which 500 were telegraphic or by telephone. In the fall the number goes down somewhat.

The Maxwell company has recently perfected a service organization system covering the entire country, fourteen service stations having been established. The Newcastle plant is the supply station for these, in addition to supplying direct its own territory which embraces the middle central states.

This service system which has been in the process of formation for some time went into effect on Jan. 1 and it makes for a quicker supply of parts from the stocks in the fourteen cities, for each takes care of adjacent territory. They are all under the direction of the main service plant at Newcastle, and carry stocks for the present model and also for the four-25, the six-50 and the four-35 which were made up to a year ago by the present Maxwell company. These outlying stations do not attempt to have parts for the obsolete cars, for only the Newcastle plant and a supply station at San Francisco do that. Thirteen of the fourteen stations have been definitely established, being in the cities of Chicago, New York, Memphis, Atlanta, Minneapolis, Dallas, Boston, Kansas City, Omaha, Pittsburgh, San Francisco, Detroit and Windsor, Can.

While congratulating the Maxwell company upon its foresight and initiative in establishing this plant it is impossible to forego the opportunity of pointing out the daily growing importance of proper organization for the supply of spares, since a little reflection shows that in 10 years the demand will be vastly greater than it is today.



Some of the blanks used at the Maxwell company's Newcastle plant in filling parts orders from owners of old models. Left—Acknowledgment of order which is sent out upon receipt of owner's letter. Center—Report from service department. Right—Shipping department's report

The Improvement of Spring Systems—VII

By M. C. K.

(2)—Shocks and Movements of Vehicles Equipped with Springs and Rigid Tires

(*Continued*)

STILL some remarks which, on second thought, seem better disposed of now than later, on the tempering of horizontal shocks and the relations of an improvement of this kind to customary construction!

It was shown in last instalment that, so far as vehicles not equipped with air tires are concerned, the very considerable shock forces involved in retardations and accelerations remain uncushioned and are resisted by mere brute strength of materials, with the result that strong vibrations are the rule and fractures of radius rods, springs and shackles and of frail portions of the load are not uncommon; also that such uncushioned shocks of considerable severity must occur in all rough driving whenever a road obstacle rises somewhat sharply before the wheels and in lesser degree under other circumstances, always accompanying in some measure the vertical shocks which are cushioned by the springs. From the figures it appeared that the neglected horizontally-acting shocks probably are more severe, representing a greater kinetic energy, than the vertical shocks in the case of an obstacle 3 inches high encountered by wheels of 40 inch diameter at a speed of 35 miles per hour. A higher obstacle and a smaller wheel would of course increase the horizontal component of a shock more than the vertical component, while the effect of higher or lower speed in this respect may be more doubtful and subject to special inquiry.

Relief for Air Tires

The unavoidable inference to the effect that the most severe work required of air tires, where these are fitted, is that of absorbing the horizontal shocks, Fig. 15, which are not otherwise cushioned (most severe, unless the lateral shocks so far not considered at all should prove even worse) brings this side of the subject into sharp actuality for vehicles with air tires as well as for the commercial vehicles whose tires can do but little in absorbing or distributing shocks. It may be that air tires would last longer if they were relieved of the worst strains through the possibility of a spring-resisted horizontal movement of the wheel axles or by other equivalent provisions. It may also be that the degree of inflation which conduces to maximum durability would be more acceptable to the vehicle users, and therefore more commonly employed, if such additional provisions in the spring system assisted the tires in the horizontal cushioning and yielding. (In the special case of corded tires, in which there is not supposed to be any other horizontal yielding than that which appears as the horizontal component of radial yielding at the point of impact, the saving of fabric may be less pronounced, unless a shock is sharp enough to test the ultimate strength of the cords, but the saving of the rubber coating, on the other hand, should be so much more important, even if the radial yield with this tire construction may be greater for a given degree of inflation, but this matter belongs under the head of refinements).

Purposes of Flat Springs

It was also referred to that the prevailing use of semi-elliptic and cantilever springs of so small curvature as to be almost straight under normal load was evidently dictated by considerations inseparably associated with the use of air tires to absorb the horizontal shocks, as such flat springs in themselves tend to make these shocks worse. The purposes served by this style of springs, it was mentioned, are (1) to safeguard steering where a steering-rod extending lengthwise of the car is employed, (2) the avoidance of lengthwise sliding motion in the universal of shaft-drive cars, (3) permitting the driving thrust to be transmitted from the rear axle to the frame through the springs. It might have been added that the flat spring is also supposed (4) to resist the rolling of the car at turns better than the spring with considerable "open," on the principle indicated in Fig. 16, and that (5) the present design of brake control also makes it desirable to have as little fore-and-aft displacement of the rear axle as possible. With the exception of No. 4 these considerations are all identified with this idea that the axle movements should be confined to the respective vertical axle planes, and therefore with air tires because in practice only the use of air tires reconciles in a measure an exclusively vertical axle movement with the need of cushioning the horizontal shocks.

The moment air tires are no longer depended upon for relieving these shocks, it plainly becomes an open question how the purposes served by flat springs in cars with air tires may be attained in vehicles operated with solid tires—or even in vehicles with air tires if it is considered desirable to relieve the air tires of a large portion of the strains to which horizontal shocks subject them.

As said last week, No. 1 may practically be disposed of by using a steering-rod acting crosswise of the vehicle, No. 2 is inferior in importance to the avoidance of shock and merely involves a suitable redesigning of universal joints, No. 3 refers to a method for applying the thrust which was employed in the very early days of automobile construction, was thereafter generally abandoned and whose re-adoption has not yet been universally recognized as sound for any but light-weight and medium-weight vehicles equipped with long broad-leaved springs, and in their case only if they are supplemented by checks for the rebound or spring extensions; and the application of the method to cantilever springs is not very convenient or promising, so that it may be assumed that the flat horizontal spring will go out if cantilever springs come in.

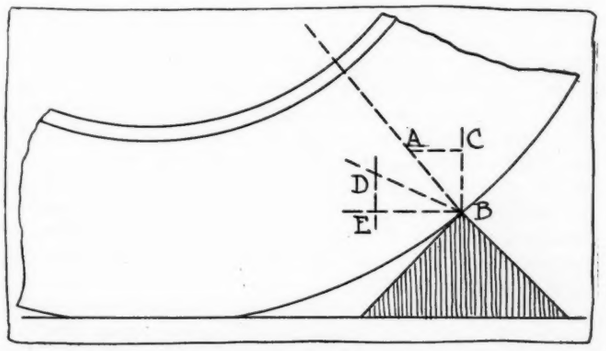


Fig. 15—Roughly illustrating the cushioning of horizontal shocks by air tires. If B yields radially as far as A, the axle will be cushioned horizontally for the distance AC. If the direction of the yield of the tire is BD, as with higher speed, the fabric is more severely deformed, but the cushioning of the horizontal shock extends over the distance BE. The distance AD represents the deformation of the fabric

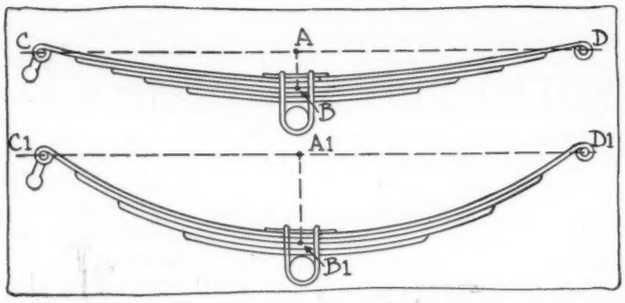


Fig. 16—Pressure acting at C and D, vertically upon the plane in which the springs normally work, has only AB as lever arm for twisting the spring, while it has the leverage A1 B1 when acting at C1 and D1

Interference with Brake Adjustment

With regard to No. 5, brake control linkage would probably long ago have been re-designed in such manner as to have the movement required of the brake pedal or lever for a given brake pressure completely independent of the relative position of the rear axle to the frame, rather than approximately independent, if the variations due to axle movement were not smaller than the lost motion due to needed clearance and to wear. With such linkage as is commonly employed, it may be figured that a deviation of the rear axle of 1 inch from its own initial vertical plane will cause a variation of only about 1 1-3 inch in the pedal movement needed for effecting a 45 degree turn of the brake cam, while clearance implies a 3 to 4 inch pedal movement, often increased to 6 inches by wear, before the brake begins to take hold.

A spring suspension providing for a relatively large but elastically resisted horizontal axle movement for the purpose of cushioning the horizontal shocks—either to replace the work done by air tires or to assist it and enlarge upon it—might call for a re-designed brake linkage, but the task of compensating for a 2-inch horizontal axle movement, for example, should scarcely deter a capable designer.

Lateral Shocks and Body Roll

Finally, with regard to No. 4, while the flat spring takes the lateral centrifugal thrust of the vehicle body at turns in the road without pronounced tendency to torsion of the leaves or wrenching of the clip—unless there is question of a cantilever spring whose tendency to cause rolling depends upon the securing of one of the thin ends of the spring to an independently movable part, namely the axle—its advantage at this point is again firmly bound with the concurrent use of air tires, since the flat spring takes the thrust without yielding and the needed cushioning of the lateral shock depends wholly upon the air tire action. Solid rubber tires, to be sure, can absorb lateral horizontal shocks much more efficiently than the longitudinal or the vertical ones, so long as they are new and extend 5 or 6 inches from the wheelrim, but when they wear down, as they must with present types of solid and cushion tires, this property is lost long before their usefulness otherwise is ended. And the general use of tire bands of sound-deadening material but without appreciable lateral or other elasticity from the beginning is among the near possibilities of the future for commercial vehicles if the cushioning of shocks can be managed independently of the tires.

In further consideration of No. 4 it is noticed that rolling of the vehicle body at turns depends mainly upon torsion of the springs only when the center of gravity of the body is very low—about the level of the pivots in the case of half-elliptic springs—but mainly upon other factors if their center of gravity lies much higher, as in all commercial vehicles. Here the action arises from the compression of the springs on the outside of the turn and the simultaneous extension of the springs on the inner side, which will force torsion of even a flat spring or, in the case of equipment with air tires, will force the axle out of parallelism with the ground by compressing the outside and relieving the inside tire. Considerable relief from the tendency to roll can be obtained now by the use of some of the spring checks in the market which retard spring extension and by overload springs on both sides of the vehicle, but the main point is that to obtain it by using a type of spring which prevents horizontal axle movement—and thereby the cushioning of horizontal shocks—incidentally implies either the acceptance of lateral shocks in all their severity, when air tires are not used, or the burdening of the air tires with the entire destructive influence of these shocks, which may be violent in the case of the vehicle skidding into ruts and under similar conditions. There is thus occasion to look for better expedients than the flat spring to obviate roll, and one of the best chances lies perhaps in building up the actuating levers of spring dampers or rebound checks as robust lateral springs, since it is becoming recognized that these devices at all events should be much heavier, stronger and wear-enduring than they generally have been in the past.

Dispensable Design Features

Altogether, none of the features in present construction which are inconsistent with the much needed cushioning of horizontal shocks, coming in the direction of or opposite to the movement of the vehicle, are in themselves indispensable or even only desirable for motor vehicles in general, but represent merely a simple and elegant constructive development wholly depending upon the use of air tires for its merits; a development which leans heavily on the air tires in subjecting them to extreme stresses, and one which becomes obstructive of progress in design when accepted for vehicles which must be operated with tires having no capacity for adequate cushioning of the most severe shocks which may occur.

Clashing Opinions

Though it is in itself rational that horizontal springing should be required in motor vehicles, on account of their higher speed, while the traditions received from vehicles drawn by animals recognized only vertical springing as necessary, doubts are freely expressed in automobile circles with regard to the practicability of getting relief from horizontal shocks in commercial vehicles without constructive complications whose cost would be out of proportion to the gains to be expected in the form of reduced maintenance expense and greater comfort, speed and safety, and many persons are inclined to think that the standard spring systems in some manner do take care of the horizontal shocks in a considerable measure without special provisions to that effect. Both views are contradicted through the acknowledged advantages of air tires for absorbing the shocks in question, both the longitudinal and the lateral horizontal shocks. Air tires constitute one practicable and not very complicated means for getting relief. But there are some objections to them; their cost, their unexpected deflations, their liability to injury when heavily loaded. And they are overworked. Additional practicable means for doing what they do in the matter of the horizontal shocks, whether better or not quite so well, would save the air tires where they are used and replace them where they cannot be used. The practicability of the additional means is the issue.

Practicability Discussed

This issue came up recently in a private discussion on the construction points involved in providing for metallic spring action to temper the horizontal components of road shocks. Five distinct questions were raised which for the sake of clearness have been left in abeyance in the foregoing or

barely touched upon. It was doubted (1) if a special horizontally acting spring element was really required or a spring whose compression is accompanied by a horizontal movement could take care of vertical and horizontal shocks at the same time, and, in the latter case, (2) if the spring would need to be stronger and less flexible than one employed for vertical shocks alone. It was also held to be doubtful if (3) the driving thrust could be properly delivered from an axle capable of yielding horizontally, either through the spring, using it as a strut, or through a special thrust rod. And it was contended that, if provisions are made for absorbing the head-on shocks, it is illogical (4) not to provide similarly for the shocks of sudden accelerations, as at starts of the vehicle with heavy load on a grade, perhaps with insufficient gear reduction and the clutch inclined to grip—so much more as these shocks react upon the clutch and the motor. Lateral shocks, it was admitted, could probably be taken care of independently unless (5) the rest of the spring suspension interfered by its rigidity in the lateral directions. While not exhaustive, the talk on the subject furnished some results.

Combination Springs Impossible

Discussion of point 1 started with the suggestion that any combination-action of the vehicle spring for both kinds of shocks would be precarious, not only for fear of overloading a spring found suitable for the vertical action alone—as this might be obviated by different spring dimensions or progressive resistance to flexion, perhaps—but mainly because a severe horizontal shock, one of those that strain clips and shackles, would be insufficiently cushioned at the first moment of impact when only the small—necessarily small—movement of a spring flexible enough for the vertical cushioning were relied upon to this end. At all events a special resistance to the horizontal movement would have to be arranged, it was soon discovered, in order to get any appreciable benefit for the horizontal cushioning from the horizontal axle and spring movement. That lies in the very nature of the purely mental operation of resolving a shock which in reality is oblique into its vertical and horizontal components. But a separate spring acting, for example, upon the shackle at the rear of the main spring to prevent horizontal displacement would inavoidably act as a stiffener of the main spring for all vertical action. It was therefore concluded that the spring should be capable of horizontal movement during compression but not subject to it of necessity, and the spring resistance against the horizontal movement should be independent. In other words, the spring should be shackled both in front and at the rear. This disposed of point 2 as well.

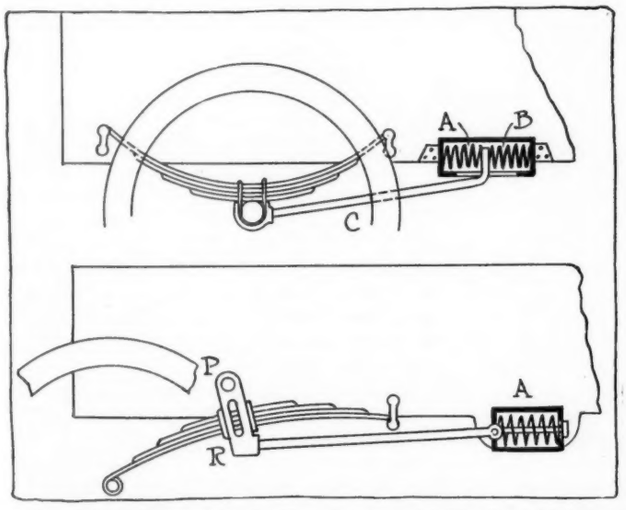


Fig. 17—Double-acting thrust rod as applied to half-elliptic springs. Spring may be flat if greater lateral rigidity is wanted

Fig. 19—Similar plan with cantilever springs, but two actions linked. Proportions and details in both cases merely diagrammatic

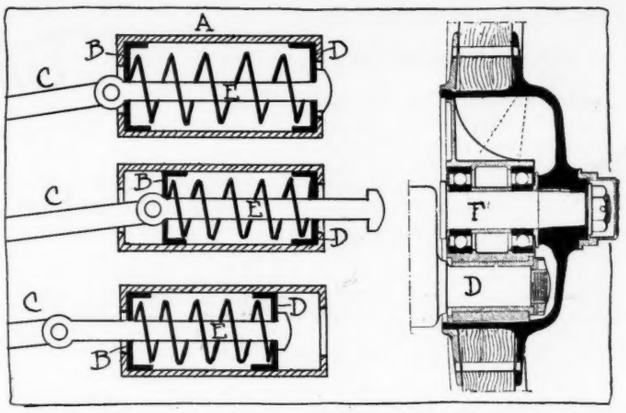


Fig. 18—A possible arrangement for taking thrust and pull from the axle by means of single double-acting spring. Fig. 20—The Genillon oscillating front wheel

Points 2 and 4 resolved themselves into the question whether a thrust rod capable of longitudinal yielding in both directions would act properly in conjunction with a double-shackled spring. Fig. 17 shows the combination in its principal elements, though the question of damper action for the recoil of the thrust rod springs might also be considered. If the two coil springs were independent of one another, A should have an initial tension (produced by compression within the confines of the cylindrical casing which is secured to the vehicle frame and contains both springs and the end of the thrust rod between them) equal to the pressure of the mildest horizontal shock deemed severe enough to require cushioning and B should have an initial tension equal to the normal full-load driving thrust on a level average road. But as one of the springs would influence the other, their tensions must be much higher—nearly doubled, at a rough estimate—and they must be equalized by compromising the two requirements, as otherwise they would tend to equalize themselves. It is possible, however, to use a single spring arranged to work in both directions, in both cases by compression. One such arrangement is shown in Fig. 19, in three different positions. C is the thrust rod, E the link with head F for transmitting the movement of the rod in either direction to the cups B and D which compress the spring and are capable of sliding on the link and in the cylindrical case A, which is secured to the vehicle frame. Probably many different devices could be made to serve the same purpose.

By applying this general principle to cantilever springs, the arrangement shown in Fig. 18 was suggested, the pivoting clip P at the middle of the spring being simply longer than usual and formed below the spring with a suitable abutment R for the thrust rod. The thrust rod spring is shown of the Fig. 19 type. The scheme was admittedly experimental.

Front Axle Problem Made Bothersome By Complication with Steering

For front springs a construction meeting all requirements as well as this is done by air tires, appearance and safe steering during jolts fully considered, is not so easily or confidently outlined. The Büssing construction, which was shown last week in Fig. 14, is elaborate and gives but a scant yield horizontally. The Genillon "oscillating wheel," Fig. 20, was found operative and safe on French army trucks in 1912 but gives very little shock-relief, because elastic resistance to the oscillation is missing, while the driving momentum is also liable to place the axle spindle D in dead-center line between the wheel spindle F and the point of wheel impact with the

(*Continued on page* 337)

Inquiries

¶ The purpose of the Rostrum department is primarily to aid in the solving of motorists' problems. Readers of THE AUTOMOBILE *are requested to allow our editorial staff aid in the solution of difficulties as they arise and perhaps through this assistance reduce the cost of upkeep of their cars and gain a useful knowledge in the economical phases of the vehicles which they use for recreation or business.*

¶ Answers are made both through the mails and through these columns, the only requirements being that the letters are legibly written on one side of the paper, and are accompanied by the name and address of the sender in order that they may be taken care of through the mails should that be deemed advisable. A nom de plume will be used should the sender so desire.

The Rostrum

Wants Two Sparks from Single Magneto

EDITOR THE AUTOMOBILE:—I am desirous of getting a little better power and efficiency out of my Teetor 4 by 6 T-head motor with Dual magneto.

From the sketch, Fig. 1, you may be able to visualize what I wish to do; that is, to use the single wire from the distributer terminal on the magneto and to attach it permanently to a wire connecting the terminals of two spark plugs.

I have not tried it as yet, my motor being still in the shop undergoing a general overhaul; nor have I ever heard of anyone else trying it; so I ask your opinion in the matter.

Jacksonville, Fla. ROY W. CORBETT.

—The scheme you suggest for getting two sparks from a single magneto would not be practicable inasmuch as the two plugs are in parallel with the source. The current will always take the path of least resistance and will jump across this path only. Therefore, nothing will be gained over the single point installation. If you desire two-point ignition you will have to change to the double-point magneto.

Causes of Overheating Briefly Outlined

EDITOR THE AUTOMOBILE:—What is the cause of overheating the motor, or of the radiator boiling? Is it the fault of the radiator, or is it the fault of carelessness in operating the motor, by giving an uneven mixture of too much spark and too little gas, or giving too much gas and very little spark, or not having the engine properly oiled, or in general by racing the motor, or leaving the car running stationary?

Chicago, Ill. I. D. WHITE.

—The reasons for motor overheating can be divided into three general groups:—1, Faulty water circulating system. 2, Faulty motor condition. 3, Improper control of motor. These three conditions will be discussed briefly as separate units although it is always possible that the reasons for overheating come under more than one of these heads.

Taking up first the faulty water-circulating system, this harks back to the designer of the car. The problem is to conduct the heat units which would raise the temperature of the cylinder walls to too high a temperature, from these cylinder walls to the radiator. The medium used for conducting this heat is water. The water enters the cylinder water jackets at one temperature and the radiator at a higher temperature. The difference between these two temperatures, and the amount of water circulated are the two factors which determine how much heat is being carried away. Thus, since the specific heat of water is unity, if 100 pounds of circulating water are being carried through the system in a minute and the difference in temperature between the water going in and the water coming out is 10 degrees, 1,000 heat units, or British thermal units as they are called, are being carried away from the cylinders every minute.

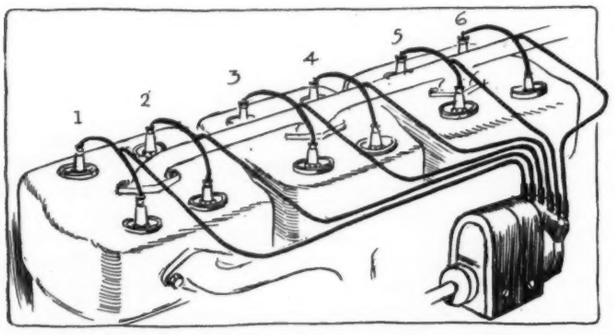


Fig. 1—Method of wiring to produce a double spark from a single magneto which is unsuccessful, because in each case the spark will choose the course of least resistance and will jump but one of the gaps

If, in order to cool this motor, it is necessary to carry away from the walls of the cylinders 1,500 B.T.U. per minute, it is evident that the cooling system is inadequate and must be corrected by either carrying more water through the system or by having a greater difference in temperature between the water going in and the water coming out.

To bring it down to the cooling system of the car as considered in general, the radiator must be great enough in area to keep the water leaving at a sufficient number of degrees cooler than the water entering the radiator. This would take care of one factor. To take care of the other factor, that is, the quantity of water passing through the cooling system, the water passages must be large enough to adequately contain the required volume and the water pumping or circulating methods must be efficient enough to be able to force this required amount of water through the circulating system.

In a word, all the elements of the cooling system must work together to carry the required amount of heat away from the engine cylinders, and should the motor heat due to a fault in the preliminary design, it can only be corrected by increasing the cooling efficiency through the use of a greater volume of water or a greater volume of cooling area.

Should the water circulation be correct, when it leaves the factory, but afterwards become faulty, it is generally due to

either clogging or leakage. If clogging is the cause of overheating the trouble may be cured by washing out the cooling system and, if leakage, the cure is to renew the gaskets or packing or whatever may be the cause of the leak.

Poor motor condition, the second cause of overheating, is generally the fault of the driver of the car. When the cylinders become full of carbon or there is not sufficient water in the circulating system, the condition of the motor is not what it should be for general running. It prevents any of the systems of the car from acting properly and the cooling system is naturally affected. The remedies for troubles that come under this head are all simple and may be summed up under the general rule of keeping the motor clean and in proper condition.

Improper control of the motor will affect heating in two principal ways; traveling with a retarded spark is one and having the mixture too rich is another. When the spark is retarded the compression has already become less than it should be at the time of explosion and the explosion itself occurs later in the stroke with the result that, instead of the gas being cooled by expansion as much as it would be with the explosion point earlier in the stroke, it is much hotter at exhaust and hence the mean temperature is higher and the heat entering the cooling water greater.

With the rich mixture the charge is also slow burning and the result is that there is a higher mean temperature in the cylinder and overheating results. With the rich mixture also, there is a notable increase in carbon deposit which also acts as an agent in decreasing the cooling efficiency.

Wiring Headlights on a Ford

Editor THE AUTOMOBILE:—Will you please let me know how to wire the headlights for my Ford car, both from magneto and battery?

Buffalo, N. Y. R. KAYSER.

—The method used to wire the headlights of your car can be determined from the three accompanying wiring diagrams, Figs. 2 and 3, which show the connections both from the magneto and from the battery.

How to Lap Piston Rings

Editor THE AUTOMOBILE:—1—Will you explain fully the method of fitting and lapping in new piston rings?

2—Please explain whether there would be any advantage gained by fitting aluminum pistons?

Koszta, Iowa. WALL BROS.

—1—Place the cylinders on the bench, and apply some ground glass and oil to the interior. The ground glass should be very fine. Then place the piston in the cylinder and work it in and out until the rings are well polished and fit tight. Lapping is an operation which requires an experienced man. Furthermore, it is advisable to use an old cylinder wherever possible as there is danger of wearing the new cylinder.

2—Aluminum pistons are lighter and reduce the vibration, because of their light weight. The expansion of aluminum under heat is greater than that of cast iron giving great difficulty in determining clearance.

Effects of Back Pressure on Exhaust

Editor THE AUTOMOBILE:—1—Can you please tell me about what the pressure per square inch is on the piston of a motor at the time of firing? Also the pressure at the time the exhaust valve starts to open?

2—What pressure is counted good compression on a cylinder?

3—What would happen if a motor had a back pressure on the exhaust of 10 pounds, and the burned gases were not all expelled when the valve closed; the intake valve to be opened after the piston had moved down far enough to reduce the pressure in the cylinders. If it would not fire in that way do you think it would fire at a lower pressure?

B'klyn, Ind. C. MCNEFF.

—1—The pressure per square inch at explosion depends upon the motor itself to a large extent, but on ordinary four-cycle gasoline engines, operating at a mean effective pressure of 90 pounds to the square inch and a terminal pressure of 40 pounds to the square inch, the combustion pressure on a good average card taken by the manograph would be about 300 pounds to the square inch.

2—Good average practice is about 70 pounds to the square inch.

3—If there were a continuous back pressure of 10 pounds on the exhaust, the pressure in the cylinder would not fall to atmospheric, but would fall to 10 pounds gauge pressure instead, approximately speaking. The result would be that all the dead gases possible would not have been expelled and the next incoming charge would be diluted to that amount. If the pressure in the exhaust passage remained constantly at 10 pounds, the piston would have to move downward on its stroke a distance necessary to produce a reduction in pressure of 10 pounds before there would be any suction on the intake. If the piston had not moved that far down when the intake valve opened, the motor would blow back through the intake manifold, giving rise to a wheezing sound or might even tend to blow the gasoline out of the float chamber on some carbureter designs. As a rule, the blowback would pass out through the air intake. All in all, this would be a very bad state of affairs and one which could not happen on a well-designed motor.

Communications

The editor of the Rostrum is anxious to secure from car users and others, communications dealing with the overcoming of difficulties in making repairs and in the numberless other phases of every-day automobiling. This department is mutual and is a common ground upon which an interchange of ideas and opinions can be made as freely as in the clubroom.

The ingenuity of the motorist who has his own garage and enjoys working upon his car is originally responsible for many of the improvements made by manufacturers. In fact, it is known that every maker is more than anxious to learn the opinions of the users of cars and is more than anxious to benefit from the experience gained by the mass of automobilists.

The Use of Thermo-Syphon Cooling

Editor THE AUTOMOBILE:—As a steady reader of your paper I would like to ask your opinion regarding the designing of motor cars. Will you tell me what you think is the reason why more manufacturers do not design their motors to be cooled by the thermo-syphon system which is so much more simple than having pumps to get out of order and a lot more places for the water to leak out. I have owned a

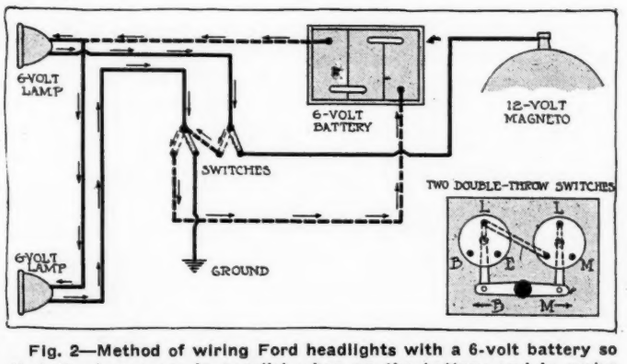


Fig. 2—Method of wiring Ford headlights with a 6-volt battery so that the lamps are in parallel when on the battery and in series when on the 12-volt magneto. The switch is arranged to be a two double-throw outfit to accomplish this result

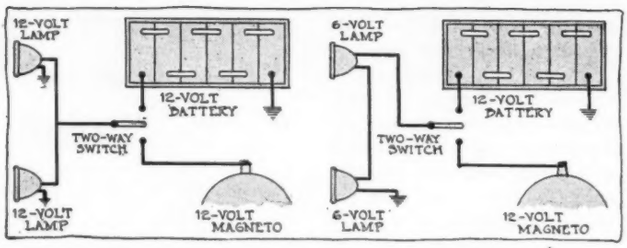


Fig. 3—Two methods of wiring Ford headlights with 12-volt batteries. Left—With lamps in parallel using 12-volt filaments, and right—with bulbs in series using 6-volt filaments

number of cars; only one of which was thermo-syphon cooled, but that one I have never been able to overheat regardless of weather or road conditions. I find that with this particular car, the motor always keeps at a temperature where it is most efficient; whereas with pump circulation the temperature is always varying.

From my observation it seems that the thermo-syphon has every advantage, but, if it has, why is it not more used?

Litchfield, Conn. F. L. VANDERPOEL.

—This has been a matter of individual opinion on the part of engineers and it has varied greatly according to their personal ideas on the subject. Generally where cars have been made to sell at the lowest possible price the thermo-syphon system has been used for the reason that the expense of the pump was eliminated and the connections are more simple, while satisfactory results are at the same time obtained. On the other hand, others believe in the use of the centrifugal because it insures a positive water supply which will be renewed with a rapidity that is proportional to the speed of the motor.

Difference in Spur and Helical Gears

Editor THE AUTOMOBILE:—1—What is the gear ratio of the Everitt six, on high speed?

2—What is the horsepower rating of this car?

3—Where are spur or helical gears used on an automobile and what is the difference between them?

4—Does the driveshaft of the rear axle of an Everitt six carry the weight?

Bryan, Ohio. A SUBSCRIBER.

—1—The gear ratio of the Everitt six was 3.5 to 1.

2—The motor was 4 inches in bore and 4.75 inches stroke, giving a horsepower rating of 38.4.

3—Spur or helical gears are used for timing. The spur gears are those in which the teeth are cut radially about the periphery of the gear wheel and in which the teeth have been generated upon a circle which is in the same plane as the circle of the gear wheel with which it engages. The helical gears have teeth which would be generated upon the surface of a cylinder as cut by a spiral wound around it. Thus, instead of advancing from tooth to tooth as in the spur gears, with the helical gears the engagement is gradual as in a worm advancing spirally by having a movement axially as well as peripherally among the gear wheel.

4—The rear axle of the Everitt is semi-floating and hence carries a portion of the car weight.

Extracting Gasoline from Gas Well

Editor THE AUTOMOBILE:—Will you please give me such information as you have on the manufacture of gasoline. I own a gas well and want to start a plant to make gasoline. Can you advise me whether or not you think it a paying proposition? R. R. PRICE.

Jane Lew, W. Va.

—The most expensive part of the operation of extracting gasoline from a gas well is in the machinery. After this is once purchased it is only necessary to pass the gas through a compressor, compressing it to about 100 pounds to the square inch. After compression the gas is passed through coils of pipe under water and cooled, after which it passes in the form of gasoline through the exhausting end of the apparatus. The gas is then passed on to the consumer's line from this point. There are a number of manufacturers who supply outfits which would be suitable for your purpose, and you can get information as to the outfit which would be best suited for your individual needs by writing to an oil well supply company. It is impossible to tell without considerable correspondence as to the needs of each individual well, as they vary in their peculiarities. Some of them produce a very dry gas which is not worth compressing, while others carry enough liquid to make it commercially worth while to make the investment in machinery. It would probably be better to determine this by calling in an engineer who is acquainted with the business.

A Mysterious Single-Cylinder Motor

Editor THE AUTOMOBILE:—I have a single-cylinder gasoline water-cooled engine marked Pierce-8 and it weighs about 150 pounds. Will you please let me know through The Rostrum who the maker is and what it was used for?

The Pierce-Arrow company, Buffalo, N. Y., has no knowledge of such a motor. I would like to know how they crank this motor as there is no extension of shaft on either end of engine. On the front end of the crankshaft is the timer, and on the rear end is a yoke keyed on the shaft and almost touching the crankcase. Which was used for cranking it and what do you advise me to attach for that purpose?

2—Could this motor run a lathe 12 by 5, or anything similar requiring the same power?

3—Do you advise the use of tire savers, jacks, which are applied under the hub caps to raise the tires off the ground? I like to use them on my Pierce which has a double limousine. The car weighs 5,500 pounds. By lifting the car on the four hub caps I fear that the differential or some other part will be injured. Is there any saving on tires by doing this every night the car stands in the garage?

New York City. J. N. LIOLIOS.

—We have been unable to find any record of a maker of this motor and are publishing this in the hope that one of our other readers will be able to give you the desired information.

2—If this motor has the power that may be assumed from its weight it should run your lathe.

3—If the car is to be left standing for any length of time it is always better to keep the weight of the car off the ground. As long as the axle housing of this car takes the weight there can be no fear of straining the differential.

Producing Oxygen Gas for Welding

Editor THE AUTOMOBILE:—1—Is the potassium-chlorate and manganese dioxide method the most economical for the production of oxygen gas in welding machines?

2—Describe the method of producing gas, the proportion those two ingredients should be mixed and the heat required to make the gas so as to use up the ingredients with the least loss.

3—What pressure should the oxygen be at when welding and should the pressure of acetylene be the same as the oxygen at the time of welding?

4—In what proportion is the caustic soda solution mixed and how far will a gallon of solution go?

5—How can the acetylene gas best be made, in a tank by itself, or are two tanks needed? What proportion of carbide to 1 pint of water?

6—What is the correct proportion of the two gases at the point of tip or nozzle?

7—What size hole is drilled in the tip commonly used?

8—What size are the tanks and what pressure do they have to withstand to be safe?

Webster, N. Dak. G. H.

—1—There are many processes more economical than the potassium-chlorate and manganese dioxide methods. There are several types of liquid air plants and several of electrolytic oxygen plants, but these are claimed to be expensive and only economical for large users. A method which is said to be inexpensive is to use an oxygen-generating outfit designed for the use of chlorate of potash. Prior to the outbreak of war in Europe the price of chlorate of potash was approximately 10 cents per pound in the New York market but, today it is about 20 cents per pound. When this is used a little manganese dioxide is mixed with the potash to retard its action in giving off the oxygen. The price of manganese has also been advanced by the war and hence this method which would ordinarily have been quite economical, at present is high. Bottled oxygen can be had at a much lower price and it is available at warehouses in most sections of the United States.

2—To fully describe this method would take more space than is available but the proportions, however, are given as 100 pounds of crystallized chlorate of potash mixed thoroughly with 13 pounds of best quality manganese dioxide.

3—A large variety of pressures of both the acetylene and oxygen are used for different purposes and, as this will vary with the nozzle, you should secure from the company from whom you purchase your apparatus a table showing the various pressures of oxygen and acetylene used in the different sized torch tips.

4—The caustic soda solution used in connection with the chlorate of potash method for making oxygen is placed in one of the three washers to remove common impurities. For a washer about the size of a common barrel, 2 pounds of caustic soda should be used and the solution should be frequently changed.

5—The insurance requirement is that the generating chamber should hold 1 gallon of water to each pound of carbide capacity. Acetylene generators should never be used until they are passed upon by the laboratories for the National Board of Fire Underwriters as the requirements of the board are very strict and it is positively dangerous to attempt to use a generator which does not have such approval.

6—This is covered under answer 3.

7—There are so many different sizes of tips that this question cannot be answered.

8—Acetylene tanks are filled with a chlorate substance such as asbestos disks thoroughly dried and compressed into tanks and which are saturated with acetone which dissolves the acetylene. The object of this is to exclude every particle of air. The acetone will absorb the acetylene and give it off when the pressure is released. Acetylene should never be compressed into an empty tank at more than 30 pounds pressure and the insurance laws require that generators have blow-offs which operate at 15 pounds pressure. These tanks are patented construction and are very carefully made to overcome the dangers which would surround them otherwise. Special generating in compressing plants is required and the gas should be chemically purified before being compressed into acetylene cylinders.

Calculating the Piston Displacement

Editor THE AUTOMOBILE:—1—Give me the S. A. E. formula for figuring the horsepower of a gasoline motor.

2—What is the meaning of piston displacement?

3—How is the piston displacement of a motor figured?

4—Give me the figures of the piston displacement of a six-cylinder motor, 5.75 bore and 6.5 stroke.

5—What would be the horsepower S. A. E. rating of a six-cylinder 5.75 bore and 6.5 stroke.

6—Which engine gives the most power with the same bore, a long or short stroke?

Akron, O. A. D. A.

—1—The S. A. E. formula for figuring the horsepower of a gasoline motor is $\frac{D^2N}{2.5}$ in which D is the diameter of the cylinder and N the number of cylinders.

2—The piston displacement of a motor is the volume through which the piston moves during a stroke, multiplied by the number of cylinders to determine the displacement for the whole motor.

3—Calculating the piston displacement of a motor consists in determining the volume of the cylinder generated by the top of the piston in passing through the distance of one stroke and then by multiplying this by the number of cylinders to get the total piston displacement. Hence, the displacement is obtained by multiplying the area of the cylinder cross section by the stroke. Where the diameter of the cylinder D is known, the piston displacement of a four-cylinder motor with a stroke S becomes $.7854\ D^2 \times S \times 4$ or $3.1416\ D^2S$; for a six-cylinder motor $4.7124\ D^2S$ would be the formula.

4—Piston displacement of a six-cylinder 5.75 by 6.5 motor is 506.4 cubic inches.

5—The S. A. E. horsepower rating of a motor of this size would be 79.5.

6—If the bore is the same the motor with the longer stroke would have more power because its piston displacement would be greater and hence the charge drawn into the cylinders would be larger. See Fig. 4.

Castile Soap for Mohair Tops

Editor THE AUTOMOBILE:—I have frequently heard persons ask what sort of dressing they should use to remove the spots from the mohair tops of their cars. In answer to these inquiries I think the safest information to give is that castile soap with luke-warm water will generally remove these spots. Many of the users of these tops employ gasoline which dissolves the rubber interlining.

Detroit, Mich. J. L. T.

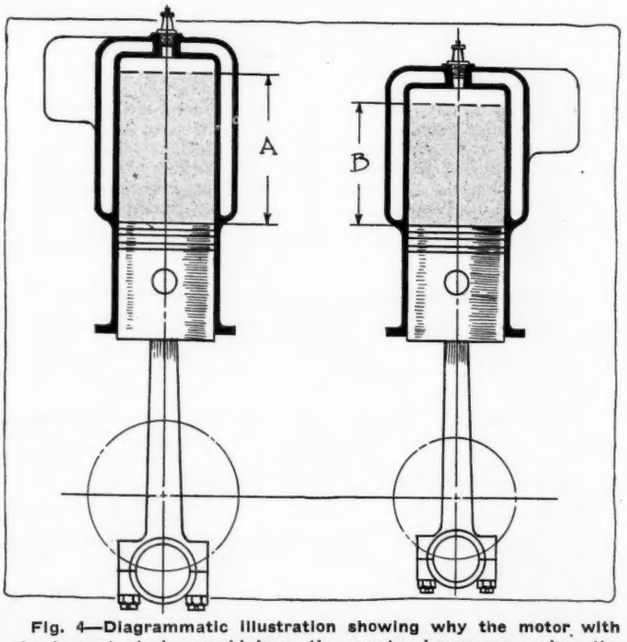
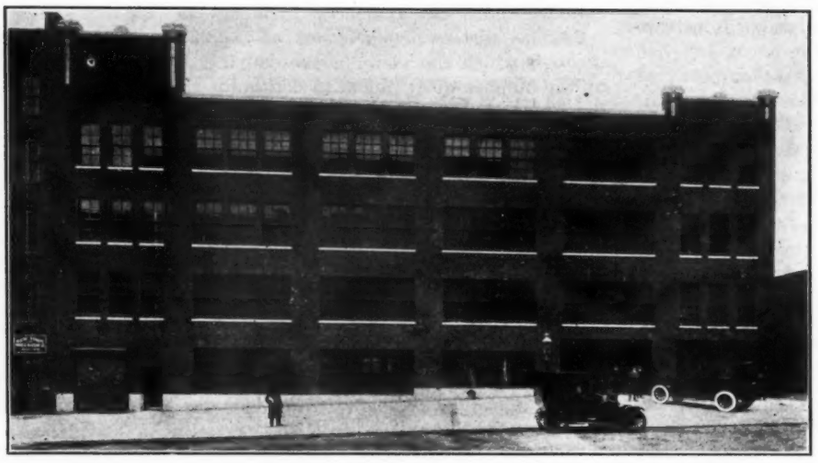


Fig. 4—Diagrammatic illustration showing why the motor with the longest stroke would have the greater horsepower when the bores are equal. It is evident that the piston displacement is greater with the longer stroke, and hence more gas is drawn into that cylinder

New A. C. A. Garage Uses Ramps



New garage of the Automobile Club of America on 72nd Street, New York City

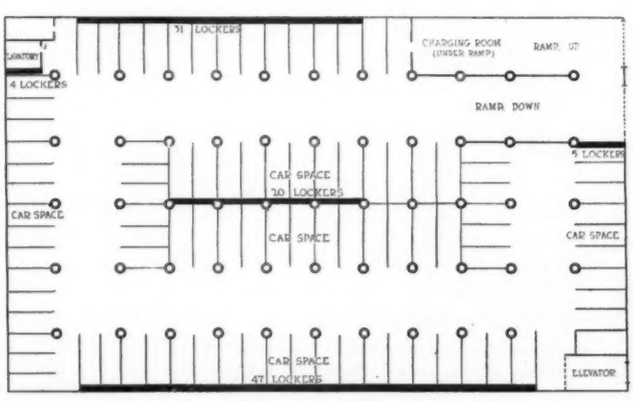
Inclined Planes Replace Elevators, Saving Space and Reducing Operating Expense —Doors Controlled by Compressed Air

BY the use of ramps in place of elevators in the new garage of the Automobile Club of America, an incalculable amount of time and upkeep expense has been saved without an appreciable loss of floorspace. These ramps, or inclined planes, allow the cars to be driven from floor to floor with the ease and freedom provided by a 10 per cent. incline, thus eliminating the inevitable delays which elevators always cause and at the same time allowing any number of cars to go upward and downward at the same time.

Besides incorporating these ramps in the new garage, which is located at Seventy-second street, overlooking the East River, New York City, many other features of interest have been included which not only tend to make this building a model of convenience for the car owner and driver, but also help to make it remarkable in its economical arrangement. For instance, due to the plan of construction this garage has the lowest insurance rate of any in New York City; instead of manually-operated doors the doors are raised and lowered by compressed air and at no time must a car wait for another before it is free to enter or leave the building.

Many New Ideas

While this garage is only available to members of the club, it still includes features which could be used to advantage in any of the new garages under construction. The idea of ramps, while not new, is one that has failed to be appreciated to the extent which the accompanying economy and convenience would justify. For the economy feature, it is only necessary to consider the concrete case of the ramps used in this one garage. Here are three floors devoted to live storage. At the entrance are two doors, one leading to a slight incline downward to the lowest floor, the other up a 10 per cent. incline to the second floor. From the second floor to the third there is another 10 per cent. grade which renders all three of these floors accessible to any car. It is possible to drive a car from the farthest corner of the third floor to the street at 20 miles an hour. The distance of this trip would be not over 600 feet and could be made at this rate in 21 seconds. At the safe speed of 15 miles an hour this 600 feet would be made in 28 seconds.



Plan of first floor, showing arrangement of car spaces, lockers, etc. Note the one elevator in the building

Two cars can pass comfortably on the ramps, thus avoiding any possibility of congestion on the up or down trip and the aisles on each floor are also wide enough to obtain the same condition. As will be noted from the illustration of the floor plan there are a number of pillars which form natural divisions for storage spaces, it being possible without any crowding to accommodate two cars between each pair. All cars face the aisles and hence it is only necessary to start the car, drive out into the aisle, and down the ramp, if on the second and third floors, and up the ramp, if on the lower floor, to reach the entrance to the building.

To get down to the figures of the installation, it is estimated that the ramps replace five elevators. Assuming the ramp to be half covered by the ceiling above, the length of the open space for the ramps totals about 150 feet and with the 20-foot width this would mean a floor area of 3,000 square feet and with a floor height of 12 feet the volume of the wedge-shaped space lost amounts to 18,000 cubic feet, the space under the slope being considered usable.

Space Saved by Ramps

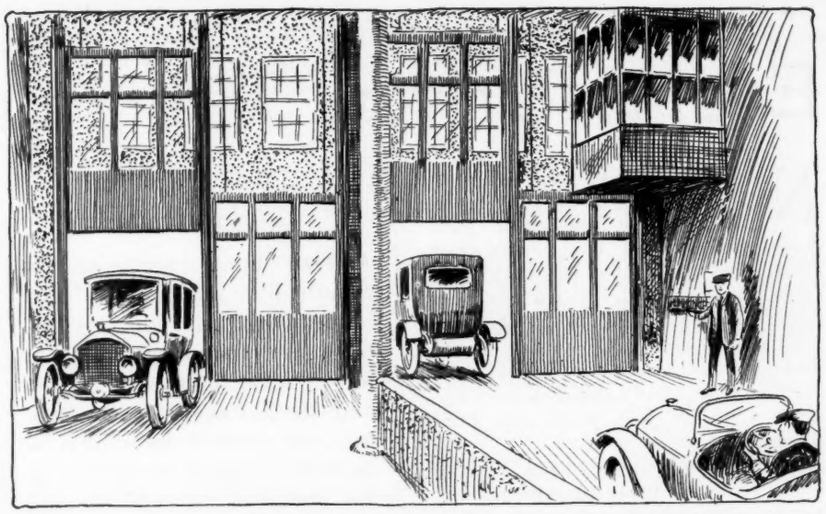
With elevators the area on each floor would be 12 by 20, or 240 square feet. With five of these elevators on the three live floors the total floor area used would be 3,600 square feet and the total volume occupied as far as these three floors are concerned would be 43,200 cubic feet. This shows that, volume for volume, the ramps take up 7,200 cubic feet less than the elevators and area for area 1,400 square feet more. At the same time they are more efficient, quicker, have no upkeep expense, are not subject to mechanical break-downs, and do not require the expensive services of attendants.

Thus far the fourth floor of the garage has not been taken into consideration. This is for cars on dead storage and is accessible through the one elevator in the building. Cars which have been disabled or which are not supplied with fuel can be taken to this floor upon which are located the repair department and the paint-shop, besides the space for dead storage.

It is estimated that the annual expense necessary for five elevators is $6,240 for operators alone. Adding to this the maintenance in current consumption the cost runs into quite a large sum. With the ramps, after the installation has once been made, expense ceases. Thus it would seem that this form of construction is ideal for buildings where there is a

large floor area and a sufficient length to permit of a slope of 15 per cent. or less.

Economy of car handling does not cease with the use of ramps. Another feature is the front door design which includes a compressed air feature for opening and closing these entrances to the building. The doors open by sliding upward and close by gravity. They have counterweights which are just slightly less in weight than the door itself and are operated by pistons in long cylinders. The air valves are controlled by solenoids which are set in operation by touching a switch located at the entrance or in the checker's office which overhangs the entrance. This installation has been made by the Burdett-Rowntree Mfg. Co.



Door arrangement. At the left a car is shown on its way from the street level to the second floor, while at the right two others are going from the street level down to the first floor. The doors themselves are operated by compressed air controlled by a switch

Automatic Gasoline Pump

Another new feature is the use of an automatic motor-driven pump which delivers gasoline to the different floors where it is distributed to the portable tanks. This is a two-cylinder pump geared to an electric motor and is located on the first floor. Beneath the building there are six 275-gallon tanks filled from a plug in the street. These tanks can be drawn upon from any floor at the central distributing station for that floor, by holding down a valve. The instant the hand is removed from the valve the pump ceases to operate. All the gasoline drawn is measured automatically on the first floor. Between the pump and the discharge valve is a filter, an air separator and the meter. Any of these devices can be cut out by means of by-passes. The gasoline drawn on each individual floor is also measured by automatic gauges on the respective floors.

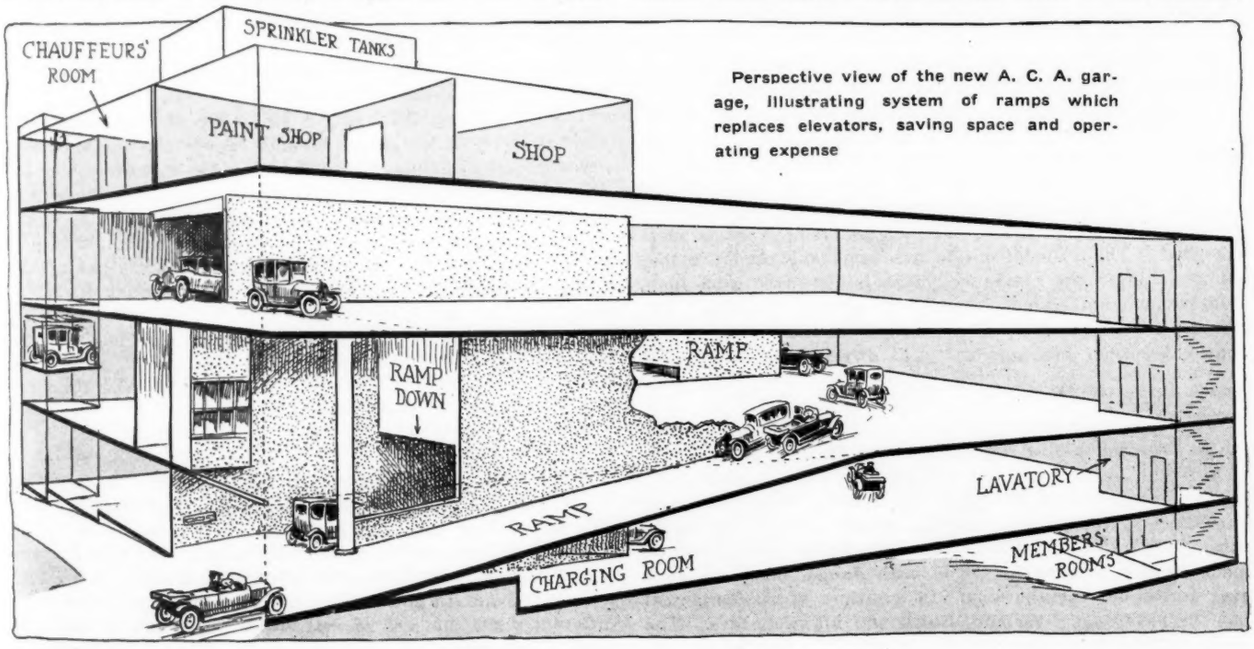
With the exception of the ramp arrangement the three live-storage floors are similar. Referring to the floor plan herewith an idea of the arrangement of these three floors may be gained. It will be noted that there are five lengthwise rows of concrete pillars which divide the garage into rectangles approximately 15 by 20 feet. The space between the first and second row of the pillars around the entire floor acts as an aisle. Around the walls are specially-designed steel lockers, one for each car. In each there is a hat shelf, robe rail and four coat hooks. The volume provided for storage in these lockers is sufficient for spare tires and other large accessories. The lockers are 3 feet wide, 2 feet deep and 5 feet high.

There are four wash spaces on each floor. All are situated in the aisles near the corners and, as the width of the aisle is 18 feet, there is still plenty of space for a car to pass. There is an electric light between adjacent cars and one on every other pillar as well as separate aisle lights. The lights between the cars are placed so as to illuminate the motor when the hood is lifted. A trouble lamp socket, compressed air outlet and vacuum cleaner connection are located on every other pillar in alternate rows.

Fire Protection Thorough

For fire protection there is an automatic sprinkler system, fire pails of sand, and Pyrene fire extinguishers placed short distances apart on each floor. In addition to these the entrance to each ramp and the elevator are provided with fireproof roll doors held open by fusible connections which will melt allowing the door to fall in case of fire.

The fourth floor extends only part of the way over the building. It contains the dead storage space and the chauffeurs' headquarters together with the paint and repair shop. The basement also is only a half floor, due to the fact that Seventy-second street is several feet above the level of Seventy-first. In this part of the building there is a dressing room for ladies, a members' room and a supply store. The boiler room, compressed air vacuum outfits and tire pump are are situated on this floor and separated from the remainder of the building by fireproof walls. In the basement is also a master clock which controls all the clocks in the building.



Perspective view of the new A. C. A. garage, illustrating system of ramps which replaces elevators, saving space and operating expense

Engine-Driven Tire Pumps for 1915

NO great development has taken place in the power tire pump field during the past year. Some models have been added and others discontinued but the same principles are employed. There has been practically no alteration in the materials or workmanship on any of the models. Reductions in prices have been made in some cases, however, and more concerns are producing Ford pumps.

The Brown company has reduced the price on its spark plug pumps and taken over the manufacture of the Sanford pump. The Advance company has brought out a two-cylinder model for Fords, Manzel has a one-cylinder design for Fords and so has Kellogg. A new Ford spark plug pump is made by Mayo. Kingston is making a new model with a 3-inch bore and a .75-inch stroke. Master is manufacturing a new one-cylinder type. Mayo valve cap pumps may also be considered new for 1915 although they were announced some weeks ago.

Development

¶ Tire pump situation is practically unchanged. No innovations in construction have been introduced. Some new models have been added, and others have been dropped, but the general indication is that the designs of last year are satisfactory and so are continued.

¶ The Brown company has reduced the price on spark plug pump. Kingston has a new model.

¶ New Ford pumps have been announced by Advance, Manzel, Kellogg and Mayo.

The Advance Machinery Co., Toledo, O., is specializing on two pumps, the Advance Toledo, a single-cylinder, engine-driven pump of 6 cubic inches piston displacement and the Advance Ford, a two-cylinder model for Fords only. The Aero models of two and three cylinders will be continued also. The Advance Toledo has a bore and stroke of 2.19 by 1.62 inches and the Advance Ford, 1.125 by 1 inch. The Aero pumps have cylinders 1.375 by 1.625 inches.

All of these pumps are designed to be driven at engine speed, giving their best service at 375 r.p.m., but having an operating range of 300 to 500. The Ford pump will inflate a Ford tire in 2 minutes at an engine speed of 500 to a pressure of 65 pounds.

The Advance Ford is the newest model. The cylinders are of special close-grained grey iron. The pump cylinder is of the double-end compression type with a single piston driven by a yoked connecting-rod with a straight line drive, thus eliminating the side thrust of the piston against the cylinder walls. The piston is packed with three rings at each end and these prevent oil from reaching the tires.

The ported type of intake has been adopted. Narrow ports are used. The cylinder heads are removable and are machined so that the clearance space is not over 1-32 inch. Quarter-inch ball valves retained by springs are used. The cylinder is lubricated by wicks located in the middle of the body. All other bearings are oiled direct.

Brown Prices Reduced

Price reductions have been made on the two Brown models, the Impulse spark-plug type tire pump selling for $12, instead of $15, and the Brown, Jr., for Fords, for $5.50 instead of $7.

The Lewis-Sanford Pump Works, Boston, Mass., has been purchased by the Brown company, which is located in Syracuse, N. Y., and a single-cylinder gear-driven pump will be made at this factory for $8.50 with gauge, hose and split gear for Ford installations. In addition, attachments will soon be ready for Overland, Buick and Maxwell cars. The equipment for these cars will list at $10.

The Sanford is air-cooled, the cylinder is made of grey iron and has a bore and stroke of 1 inch. The crankshaft is a drop-forging, machined and lapped, and runs in bronze bearings.

Dewey Spark Plug Pump Unchanged

No change is found in the Dewey power tire pump which is a spark-plug type and is capable of being operated by any multi-cylindered engine. When it is desired to inflate a tire, a spark-plug is removed from one of the cylinders, the pump is screwed in its place and the motor run idle on the remaining cylinders. The compression and suction of the cylinder to which the pump is attached furnishes the motive power for the tire pump. Bore and stroke are respectively, 1.312 by 3 inches.

The maker states that the pump works best when the motor is run at a speed of between 400 and 500 r.p.m.

By the use of a large breather valve, pure air is taken into the engine cylinder during the suction stroke, giving that particular cylinder the full compression so that a pressure of from 50 to 75 pounds is developed. The Dewey-Anderson Co., Toledo, O., makes this pump.

Folberth Operated by Motor Piston

The Folberth is unique in that there is a mechanical connection between the top of the piston of one cylinder with gasoline engine and the piston of the power tire pump. The pump piston rod extends down through the cylinder head and rests on the piston. The upward movement of the piston raises the pump piston and when the upper limit of the stroke is reached, the piston and rod are returned by the air pressure on the upper side of the pump piston and the suction on the lower side. The intake air valve is a poppet type and the exhaust valve is a ball.

The advantages claimed for this type of pump are that high capacity is obtained without racing the motor, there are a minimum of moving parts, silence of operation and the delivery of clean air, untainted with oil. The operating speed is 300 to 400 revolutions per minute.

The pump is manufactured in only one model, the bore being 1.5 inches and the stroke being equal to that of the motor on which it is installed. The speed should never exceed 500 revolutions per minute.

The pump has an outside diameter of 2.5 inches and the length is always 2 inches longer than the stroke of the motor. The weight is 5 pounds. It is made by the Folberth Auto Specialty Co., Cleveland, O.

Hert Makes Two Models

Single and two-cylinder air-cooled pumps are made under the name Purair by the Hert Mfg. Co., Indianapolis, Ind. The single type has a displacement of 3.5 cubic inches and the twin a displacement of 5.8 cubic inches. Both pumps are tested to 150 pounds pressure but will deliver up to 200 pounds. Brackets and fittings are furnished for about fifty different makes of cars so that either pump can be attached with a minimum amount of work. The single cylinder

measures 7 by 3.5 by 3.5 inches, weighs 6 pounds and sells for $12.50, while the two-cylinder measures 7 by 3.5 by 6 inches, weighs 9.5 pounds and lists at $16.50.

There is an oil separator and relief valve at one side of the pump. The crankshaft is a drop forging and has long bearings. The piston has three eccentric rings and the connecting-rod is an I-beam section made of solid phosphor bronze.

Two Hanna Models

Hanna power tire pumps are built in two sizes, both twin-cylinder, air-cooled models. The maker is the Troy Auto Specialty Co., Troy, N. Y. The smaller pump, style C, has a bore and stroke of 1.5 inches and a normal speed of 500 r.p.m., and the D has the same bore but a stroke of 2 inches. Its normal speed is 650 r.p.m. The prices of these two models are $25 and $35, and they may be fitted to any machines having exposed shafts.

Gemco Spark Plug Pump

A spark plug pump is manufactured by the Garage Equipment Mfg. Co., Milwaukee, Wis., under the name of Gemco. This pump is screwed into a spark plug hole and the motor is run on the remaining cylinders. The compression of the cylinder in which the pump is installed operates a piston in the pump and thus pure air is delivered to the tires. In addition to the pump there is a gauge and 12 feet of rubber hose. The price is $12 and, without the gauge, $10.

Herz B. B. a Two-Cylinder

The twin-cylinder vertical pump made by Herz & Co., 245 West Fifty-fifth street, New York City, will be continued without change. It is known as the B. B. The cylinder dimensions are 1.375 by 2.5 inches and the overall dimensions 11 by 3.5 by 8.75 inches. The weight is 7 pounds and the price $30. Pressures up to 250 pounds can be obtained.

Lubrication is by splash. The intake and exhaust valves are contained within housing screwed into the cylinder heads and are therefore easily removable for inspection. A safety valve placed in the discharge line makes it impossible to pump to more than a predetermined pressure.

The drive is by coupling, gear or sprocket wheel, and chain and a clutch for starting and stopping the pump are furnished when desired. In attaching the pump it is necessary, in some cases, to fasten a strap or iron plate from the chassis to the motor base and attach the pump over the water pump shaft, drive being by means of silent chain. In other cases it is better to cut through the crankcase and drive the pump from the timing gears direct. Another method of mounting is on an iron plate in front of the gearset, the pump being driven from the clutch shaft by a silent chain.

Kellogg Has Complete Line

Seven motor-driven tire pumps constitute the line of the Kellogg Mfg. Co., Rochester, N. Y. The leaders are a single-cylinder pump of large bore and very short stroke, introduced a few weeks ago, and a brand new model for Fords. Other types are built with two, four and six cylinders.

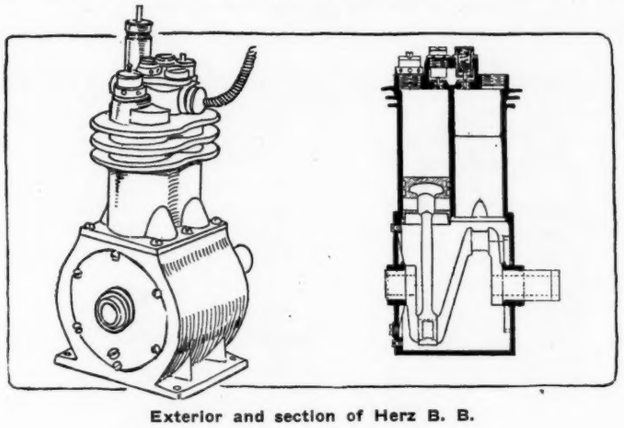
The new Ford machine is a single-cylinder design which is placed at the right of the motor, the drive being taken through the camshaft. A gear is attached to camshaft and the pump is bolted in place. The whole installation may be accomplished in one-half hour—there are no holes to drill and only two nuts to tighten. In case the timer is worn a new one is furnished.

The cylinder is of close-grained, grey iron and the piston is fitted with ground steel rings. The bearings are phosphor bronze.

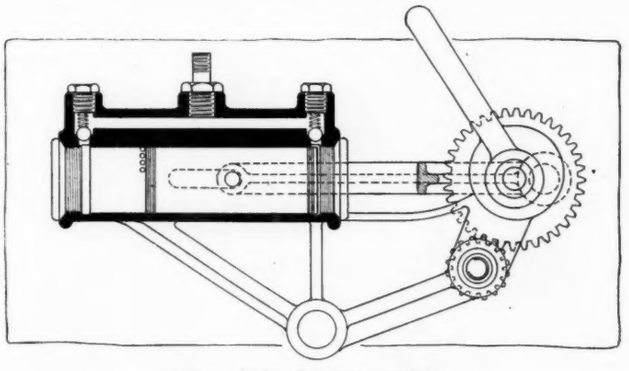
The large-bore, single-cylinder pump is made of metal throughout, no leather or rubber being used even for packing. The bore and stroke is 3 by .75 inches. The cylinder is grey iron and the piston is fitted with two metal piston rings which resemble those used in automobile motors. This is possible on account of the large diameter of the piston. Intake and exhaust valve are of comparatively large size and are of the poppet type.

The crankshaft is drop-forged and is supported at each end by two bronze bearings. Two connecting-rods are used, thus minimizing the wear and necessity for replacement, it is stated.

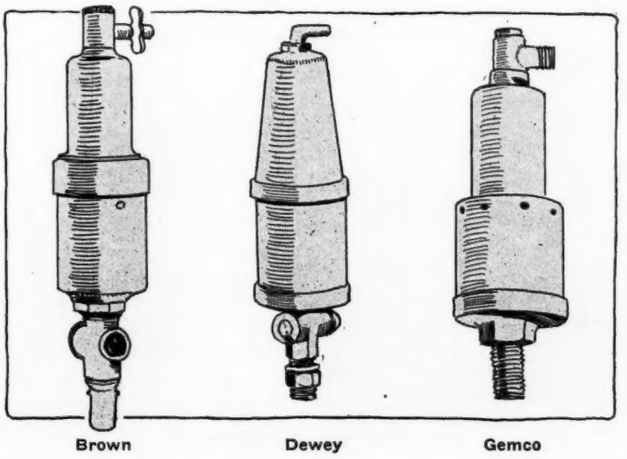
The construction of the piston is novel in that it is not guided by the cylinder walls but partly by the double connecting-rod arrangement and partly by a guide which slides over the crankshaft between the two connecting-rod eccentric bearings. Obviously since there are two connecting-rods, the piston is held solidly against tipping in one direction. Tipping in a direction at right angles is prevented by means



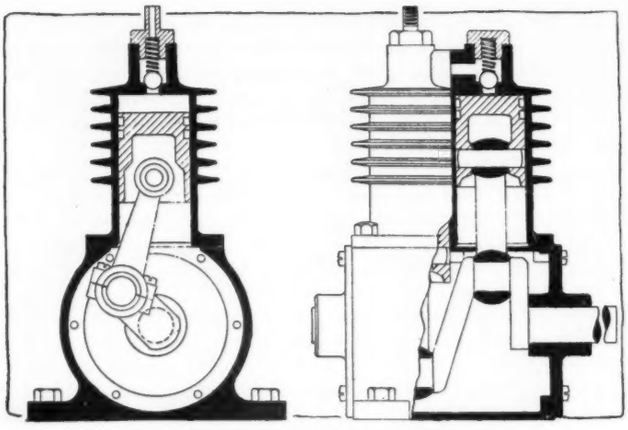
Exterior and section of Herz B. B.



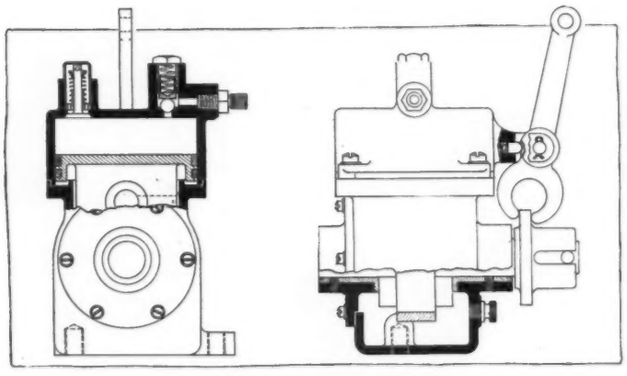
One of the Advance models



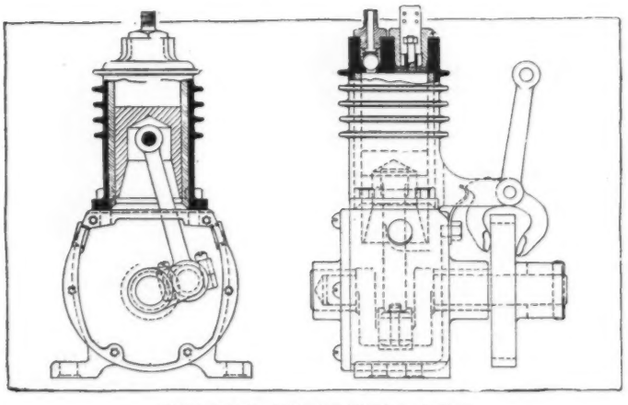
Brown Dewey Gemco



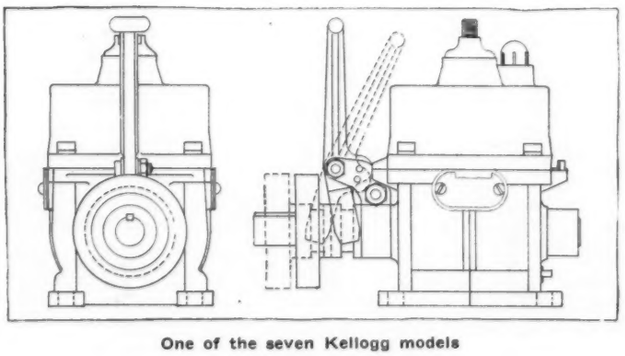
One of the two-cylinder Hanna types



New single-cylinder Kingston



New single-cylinder Master design



One of the seven Kellogg models

of the guide just mentioned which is a snug sliding fit over the center part of the crankshaft.

This construction permits the use of a baffle plate, which prevents all oil from reaching the cylinder wall or the under side of the piston, it is said. On the upper side of this baffle plate, is a felt washer which is supplied with oil from the reservoir in the crankcase of the pump. On each down-stroke the piston compresses the felt, so that a certain amount of oil is supplied for piston lubrication. An overflow drain determines the level of oil in the crankcase.

The price of this pump with rubber tubing, gauge and attachments for installing on all the ordinary makes of cars is $15.

The two-cylinder pump has a bore and stroke of 1.5 by 1.44 inches and is designed to run at 600 to 700 r.p.m. The maximum working pressure is 200 pounds and the price is $21.50 complete with rubber tubing, gauge and metal attachments.

The four-cylinder pump is featured by having cylinders of hard brass tubing. A pump of similar appearance, but with a water-cooled head, is also made and is designed especially for use with compressed air starting systems. Another water-cooled model has cast-iron cylinders. A six-cylinder water-cooled pump capable of delivering 5.5 cubic feet of free-air per minute at 650 r.p.m. is made for heavy service where high pressure and large volume are desired. The cylinders are set V-shape, two pistons being operated by one throw of the crankshaft. Each piston is fitted with two metal rings. The crankshaft is supported by ball bearings and the lubrication is by splash.

Kingston Employs Large Bore

An entirely new type of pump has been brought out by the Kokomo Electric Co., Kokomo, Ind., maker of Kingston specialties. It has a single cylinder with 3-inch bore and .75-inch stroke. Two piston rings are used. The intake valve is a poppet type and the exhaust valve a spring-seated ball. Its normal speed is 500 r.p.m. It is capable of generating pressures up to 125 pounds. Price is $15.

Lipman Has New Model

A new design brought out by the Lipman Air Appliance Co., Beloit, Wis., is a single cylinder air-cooled model selling for $15. The bore and stroke are 2 by 1.25 inches. The pump is made of metal throughout, the cylinder is gray iron and the crankshaft a drop forging with two plain bearings. The piston is fitted with eight steel rings. Splash oiling is employed and there is an opening in the crank chamber to keep the level constant, the excess oil running out through this opening. The pump weighs 5.5 pounds and is brought into action by means of a sliding gear.

The four-cylinder pump is continued without change. Its cylinders are 1.25 inches square and it sells for $25. Cylinders and pistons are gray iron and crankshaft is a drop forging. The valves are situated in the head and are of the poppet valve type. The mechanism is completely inclosed.

Manzel Makes One-Cylinder Ford

A single-cylinder, air-cooled, gear-driven tire pump for Fords is the new feature of the line made by Manzel Bros. Co., Buffalo, N. Y. The two-cylinder model is continued.

The Ford model sells for $7.50 complete with steel gears, 12 feet of hose, gauge and everything for installation. It can be installed in 45 minutes. No machine work of any kind is required.

The pump is mounted at the left of the motor and just above the crankshaft. The fan pulley on the crankshaft is removed and the split gear put in its place and this drives the pump which is bolted to the crankcase. The split gear also incorporates the fan pulley. When the pump is not operated the gear is out of mesh.

The two-cylinder Manzel model has a gear drive and is

made for all standard makes of cars for $20. The cylinders and pistons are grey iron and the piston rings are also of iron. Bronze connecting-rod bearings are employed and the crankshaft is drop-forged. The air inlet is screened and there is an air filter to eliminate oil and secure pure air for the tires.

Marvel Ford Spark Plug Pump

The Marvel tire pump, for Fords and other small cars, is of the type which screws into a spark plug hole and which operates through the compression of the motor. It is of compound design, there being a smaller cylinder above the main cylinder. A rod connects the pistons operating in these two cylinders and when the pressure within the engine forces the lower piston upward, compressing the air above it, the upper piston also moves upward, multiplying the pressure above it also which was partially compressed by the lower piston on its previous stroke. When the higher piston is at the top of its stroke, the air above it escapes to the tire. A breather at the bottom of the apparatus prevents any but pure air from entering. This pump is said to be capable of inflating a 37 by 5 in from 3 to 4 minutes. The Marvel is a product of the Marvel Auto Supply Co., Cleveland, O., and sells for $5.

New Single-Cylinder Master

Under the trade name of Master, the Hartford Machine Screw Co., Hartford, Conn., is producing two power tire pumps for 1915. One is a single-cylinder design and the other a two-cylinder one. The one-cylinder model is a new one while the two-cylinder is carried over from last year.

The new pump has a bore and stroke of 1.5 by 1.75 inches and runs at a speed of 600 r.p.m. The overall dimensions are 4.5 by 8.5 by 5.75 inches, and the weight 8 pounds.

The cylinders on the two-cylinder type measure 1.375 by 1.75 inches, the weight is 10.5 pounds and the overall dimensions 4.5 by 8.5 by 7.25 inches.

Master pumps are air-cooled and may be gear or clutch-driven. The pistons are steel, carefully hardened and ground to size. Lubrication is by splash. The inlet valves are a flat type, hardened and ground, and the discharge valves are of the ball type.

Mayo Valve Cap Pump

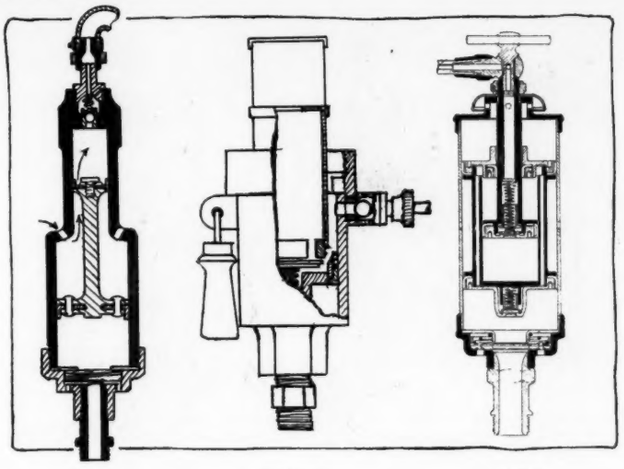
Two new models have been brought out recently by the Mayo Mfg. Co., Chicago, Ill. These are: the valve cap pump, which is similar to the spark plug pump in its principle of operation, the only difference being in the method of attachment, it being permanently fastened to the valve cap instead of screwing into the spark plug hole; and the other new model is the Mayo Ford pump, which is a spark plug type but smaller than the original spark plug pump which is continued.

Upon finishing the inflation a quarter turn of a handle closes a ground poppet valve opening into the engine cylinder, cutting out the pump and allowing the motor to resume firing on this cylinder. The hose is removed and stored in the tool box. The outfit includes a gauge and 14 feet of hose and the price is $15. The obvious advantage of this type of pump is that it is not necessary to remove a spark plug and attach the pump every time air is wanted.

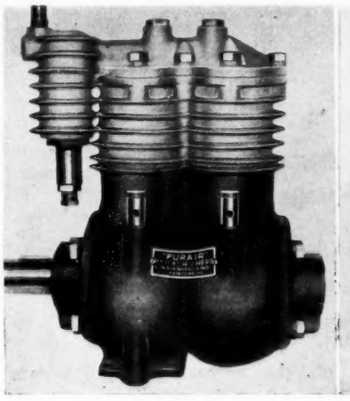
The large spark plug pump sells for $10 with 12 feet of hose and gauge, and the Ford outfit sells for $8 with 10 feet of hose, and gauge.

Medina Driven from Fan

The Medina Machine Co., Medina, O., is making a single-cylinder pump which is driven by the fan belt, being mounted in the place of the fan shaft. No machine work is required to install it. The operation is simple, the regular fan together with the pulley is removed and a pulley furnished in connection with the pump is put in its place. The price of



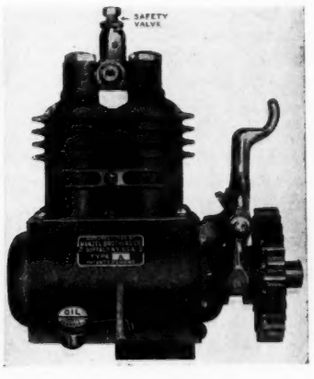
Marvel National Utility



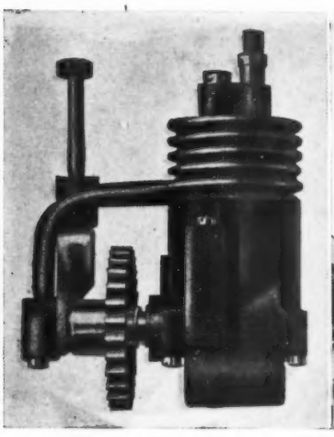
Hert Purair

Medina

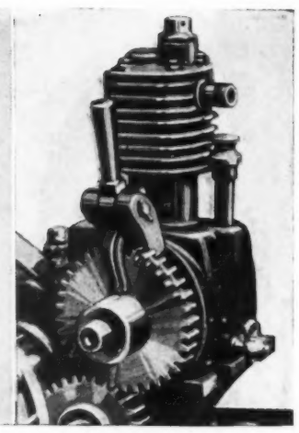
The two new Mayo models



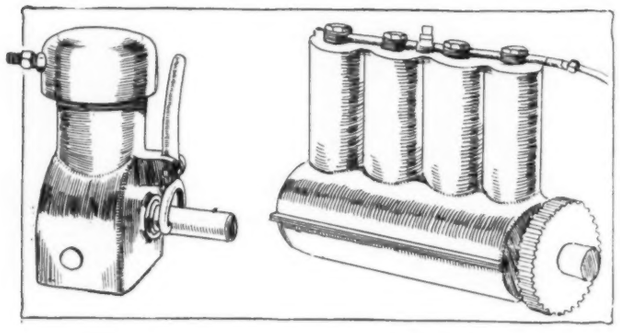
Left — Manzel single-cylinder Ford type. Right—Two-cylinder Manzel



Sanford



Advance



Peerless

this outfit complete with all the necessary brackets and attachments and with 12 feet of hose is $12.50. A plunger gauge which is used directly on the tires sells for $1 extra.

Mosco—Single-Cylinder Ford

A single-cylinder pump made for Ford cars is built by the Motor Specialties Co., Waltham, Mass., under the name of Mosco. It is mounted on the front cover of the timing gear case and driven by an eccentric. The price with 15 feet of hose is $7.50 and, with pressure gauge, $9.

National Spark Plug Pump

The National Telescope pump is a spark plug type. The outfit includes not only the pump itself, but a gauge and 12 feet of woven hose. The body of the pump is made from close-grained cylinder iron and the piston is machined from a steel bar. The piston rings are metal. It is about 5 inches high and weighs less than 6 pounds. The price is $8.50 and with gauge $9.50.

Peerless Pump a Four-Cylinder

One model of engine-driven pump is made by the Peerless Accessories Mfrs., Chicago, Ill., for the coming year. This is a four-cylinder design with 1.375 by 1.625-inch cylinders. It is run at a speed of 400 to 450 r.p.m. It can be attached without special fitting to any car with 1.25 inches of exposed magneto shafting and room for a 4.25-inch sprocket.

The cylinders are cast iron, and so are the pistons and rings. Bronze valves are used. The pump is mounted on a small steel bracket.

Stewart-Warner Makes Three Models

Three single-cylinder models are made by the Stewart-Warner Speedometer Corp., Chicago, Ill. The bore of all three is 1.44 inches, the stroke of two models is 2.5 inches and that of the third is 1.75 inches. The normal speed is 600 r.p.m. A maximum pressure of 400 pounds may be generated.

The cylinder is cast iron with vertical cooling fins on it. The base of the pump is aluminum and the piston is steel, hardened, ground and lapped. The connecting-rod is also hardened steel. Compression is maintained by making the piston a tight fit. There are no rings.

Air is taken in through an annular series of holes uncovered by the piston near the bottom of the stroke. The discharge is at the top, there being two spring-closed ball valves in series. The use of two valves eliminates all possibility of leakage.

The lubricating system is complete. The piston is oiled by means of an oil-soaked wick against which it rubs. This wick is supplied with lubricant through two filler holes which are conveniently reached from the outside. This method of oiling gives all the oil required and yet there is no excess to be carried over to injure the tires. There is but one main bearing and it is oiled by a ring oiler which is situated at the center of the bearing. The ring dips into a small well which is filled through an oil hole. The connecting-rod bearing is oiled through a hole in the end of the pump, this hole leading to a tube which rotates with the crank-pin and thus delivers its oil by centrifugal force. The bottom of the crankcase is open so that any free oil will immediately drop out.

The price complete with bracket and gears for immediate installation, 13 feet of hose and an air pressure gauge, is $15.

The dimensions of the different models are:

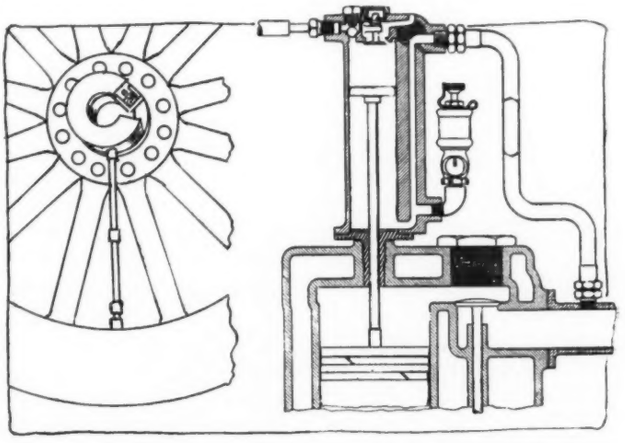
	Length	Height	Base Width	Base Length
Model 108-E.....	6.25	9.88	2.38	4.5
Model 108-D.....	6	8.25	2.38	4.5
Model 108-H.....	6	8.25	1.75	4.5

Davis Automatic Tire Inflator

To inflate tires while the car is in operation is the purpose of the Automatic Tire Inflater made by the D. L. Davis Mfg. Co., Chicago, Ill. The device consists of a pump which forces air through a tube to the axle whence it is passed to the wheel through a special joint consisting of two circular disks which revolve one upon the other, one disk being fixed to the hub of the wheel while the other is attached to the axle.

Taylor Noil Continues Diaphragm

The pump made by the Taylor Mfg. Co., Chicago, Ill., differs from other pumps on the market in that a diaphragm is used instead of a piston. The adoption of this construction effectually prevents oil from making its way into the tires as the diaphragm separates the air chamber from the rest of the pump. Compressed air is obtained by reciprocating the diaphragm in much the way a piston might be used.



Davis Automatic

Folberth in section

The intake valve is a poppet and the exhaust valve a ball type.

This pump is designed to be installed under the hood and is to run at a speed of 550 r.p.m.

The improvements in the new model are in the plunger which now works straight up and down without any side motion and in the valve fittings which are now machined instead of being rough castings as heretofore.

The height of the pump is 7.25 inches and the width across the top is 5 inches.

Ten Eyck Has New Pump

An entirely new design of single-cylinder air pump is manufactured by the Auto Air-Rotar Co., Chicago, Ill. It is known as the Ten Eyck and has a bore and stroke of 1.75 by 2.25 inches. It operates at speeds of from 300 to 800 r.p.m. and is driven from the crankshaft or water pump shaft, whichever is more convenient.

The bed plate of the pump measures 2.5 by 4.25 inches and the pump is generally mounted on a small steel forging bent at right angles and bolted to the inside of the frame on a line with the front end of the motor. The pump measures 10 by 5 by 4.5 inches and weighs 10 pounds.

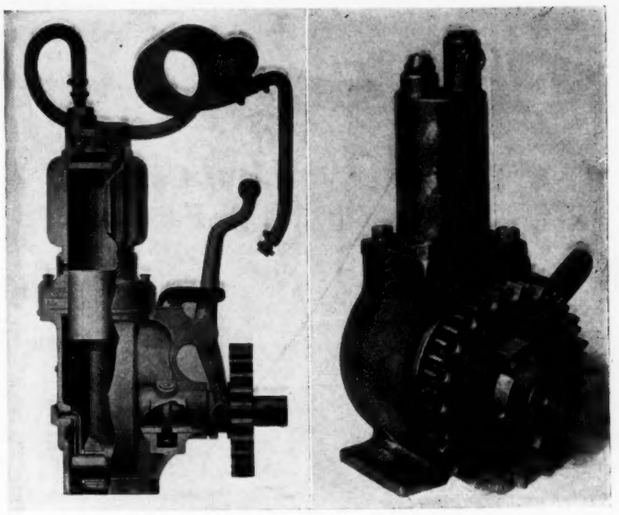
The price including 16 feet of rubber tubing, pressure gauge and tire connections is $15.

Two Utility Spark Plug Pumps

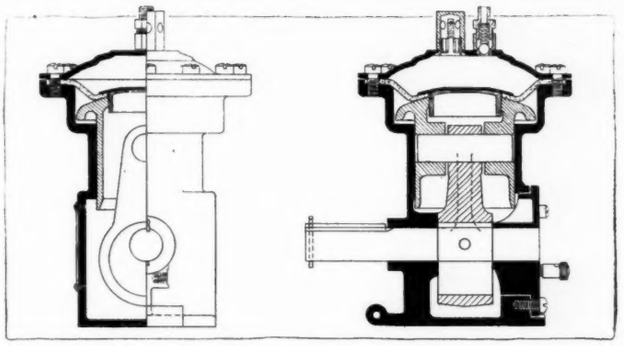
Two spark plug pumps are made by the Hill Pump Valve Co., Chicago, Ill. One is the Utility and the other the Utility Jr., the latter being for cars with tires of 3.5 inches and under, this class including Fords.

The large pump has cylinders 2.25 by 1.69 inches and measures 6.75 by 2.62 inches. It weighs 5 pounds. The small pump has a cylinder 2 by 1.25 inches, measures 6 by 2.25 inches and weighs 3.5 pounds.

These two pumps are furnished with a safety valve and gauge which is installed in the line running to the tires and which is known as a Pneu-Meter. The Utility pump complete with this safety device sells for $12 and the Utility Jr. $9.



Stewart Ten Eyck



Taylor Noil in sectional views

New Eisemann Flexible Magneto Coupling

THE Eisemann Magneto Co., Brooklyn, N. Y., has developed a new type of flexible, adjustable and fully inclosed magneto coupling which has a number of unusual features. Its principal purpose is to allow of a certain amount of deviation in the driving and driven shafts and to protect the magneto bearings; at the same time, it cushions the driving power. It will fit any standard magneto.

The device is distinctive for three reasons: (1) It is inclosed and therefore dust and dirt proof while the housing is easily removable without the use of tools; (2) it has large, flat wearing surfaces; (3) the magneto timing may be adjusted over a range of some 40 degrees—plus 20 or minus 20—without dismounting either the coupling or the magneto.

There are five essential parts to the device, though the cover may be viewed as but one part. These are the driving member A, which is attached to the magneto driving shaft in the usual manner; the driven member B, which is attached to the magneto armature, and the casing which incloses the whole.

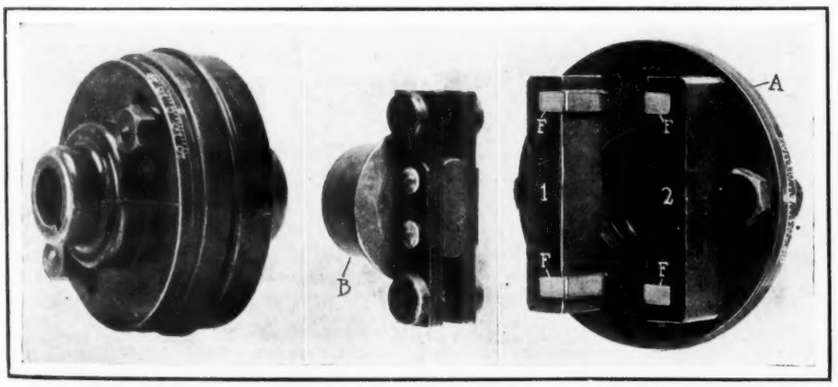
There are no moving parts in the driving member which consists of two metal plates, 1 and 2, which are attached to a face plate. This face plate bolts to a second plate which is keyed to the driving shaft. The bolts which hold the two plates together are fitted into slots, thus providing for a variation in the timing range. By simply loosening the bolts, it is possible to shift one driving member with relation to the other and thus to alter the magneto timing. On the outside of these members there is etched an adjustment scale.

To provide for ample wearing surface, large fiber plugs F are inserted in the plates 1 and 2 as shown. The driven member B consists of a number of laminations of thin spring steel riveted to the central part. This is inserted so that the round metal buttons bear against the fiber plugs.

The springs cushion the drive and whatever slight eccentricity or misalignment of the shafts may exist is allowed for by the sliding of the metal buttons over the fibre plugs. As these plugs are large and the contact surfaces flat wearing surface is ample.

One of the excellent features of the coupling is that it is possible to remove a magneto without the necessity for taking the coupling apart. The driving and driven members are simply placed vertically and after the bolts holding the magneto have been removed, the instrument may be lifted straight up, the driving member sliding off the driven member. It is not necessary to slide the magneto backward in removing it so that the use of dowel pins in the holding bracket do not interfere with the operation.

The covering which excludes dirt is a light metallic part held in place by a spring ring which fits into a groove. This casing may be removed, to inspect the coupling or for the removal of the magneto by simply taking off the spring ring and the casing, both of which can be slipped over the driveshaft.



Left—Eisemann coupling, showing adjustment scale. Center and Right—Driven and driving members, respectively. Note fiber plugs F for wearing surface

Kansas City—A Great Distributing Center

$39,000,000 Worth of Cars and Accessories Disposed of at Wholesale Prices in 1914—Farmers To Spend Big Crop Profits on Cars

By David Beecroft

KANSAS CITY, MO., Feb. 13—Farmers, automobiles, wheat and stock are the big four of this territory and the annual automobile show convention hall has served admirably to emphasize on the citizens in this part of the grain belt how dominating an influence the automobile is. The all-pervading influence of the car has assumed a new form in this city during the last 2 weeks since the invasion of the jitney car and jitney bus, there being already over 222 of such vehicles registered. At last the great middle class, nearly 45,000 of them at least, are daily making use of this new found means of locomotion, and thousands are daily imbibing the magnetism of the car, who, perhaps in their most optimistic moments had not hoped to ride to work in a real gasoline car for years to come. With this new movement another great missionary force for the car is set in action.

A Three-in-One Show

The Kansas City show is a dealers' show, a distributors' show and an owners' show. It is a three-in-one program. Convention hall when opened years ago was the target of ridicule for the city for then it was thought so big as to be useless. Now its 50,000 square feet of floor-space is but a tantalizing area for half a hundred or more distributors and dealers who have been showing their cars all week. This huge hall, nearly a smaller edition of Madison Square Garden, New York, in general design, is not half large enough for the automobile show, and its capacity is taxed nearly every month of the year. Such is the growth in the central west.

Estel Scott, president of the Kansas City Dealers' Assn., and also general manager of the G. M. C. truck interests here, reports forty-nine members in his association and every one is in the show, making a grand total of vehicles shown of 192, just one less than was shown at the Minneapolis show a week ago. Of this number 140 are gasoline passenger cars, seventeen electrics and one steam car. You must add thirty-two trucks and two tractors.

There were fifty-one different makes of gasoline cars, six of electrics, seven of gasoline trucks and two of tractors.

Territory in Kansas City is not so much a matter of geography as at Minneapolis, as this metropolis is more hedged in with such centers as Minneapolis, Omaha, Sioux City and Dallas on its confines.

Measured in square miles this zone is one of no mean proportions, and, while not embracing so many broad acres as served by the Twin Cities, it serves a zone studded with progressive farmers and stock raisers. The total area served is 204,700 square miles, an area practically equal to that of Germany, practically the same as that of France, yet one-half smaller than the distributing territory served by Minneapolis and St. Paul.

Into this zone last year Kansas City distributed $39,000,000 worth of automobiles and accessories—wholesale price figures. The Commercial Club of this city is responsible for the figures, and further subdivides these into automobiles to the value of $33,000,000 and accessories valued at $3,000,000.

As a motor car manufacturing center Kansas City is not ranked high. Local authorities speak in a rather subdued tone when referring to this. The estimate of manufactured automobile products is put at $200,000 per annum and this is all accessories. These are largely confined to Ford devices, embracing such parts as safety steering attachments, garage jacks, etc. One local firm has recently started the manufacture of trailers for motor truck use, which should bring the manufactured totals higher a year hence.

But, if not boastful of its status as an automobile manufacturing center, Kansas City is not slow in producing its statistics on live stock, crops, etc. This city is the second live stock market in the world, coming second only to Chicago, with Omaha ranking third. Last year the total receipts at the local stockyards totalled $192,500,000. Cattle make up $131,000,000 of this total, hogs $49,000,000 and sheep $12,000,000. As this stock all comes from the farms in this territory, and as farmers buy from 80 to 95 per cent. of the cars sold annually through this center, the value of stock yards to the car maker becomes at once apparent. Invest this alone in automobiles and you would absorb more than 200,000 annually of our more popular cars listing between $750 and $1,000.

But Kansas City has wheat and corn and oats. This week the grain dealers' association met here and bewailed the fact that of the 180,000,000, bushels of wheat grown in this state last year there yet remained 35,000,000 in the granaries of the farmers, who are boasting that they will hold it for $1.75 or $2 per bushel. Last July the farmer hoped to sell his wheat for 60 cents per bushel. Some did.

But what are the facts? The State of Kansas is going to have approximately $100,000,000 of unexpected money go into the hands of the farmers. Last July they did not even dream of this additional cash. Today it is partly in their hands and within a few months they have hopes of increasing the amount.

Farmers Buy Cars

And the Kansas farmer buys cars just as the Minnesota farmer, the Nebraska farmer and the Iowa farmer. The Ford dealer in Salina, Kan., a city of 10,000 in the center of the state, distributed 2,000 cars last year and is going higher for this year. So with Overland, Buick and Studebaker, with Ford the big four in motor parlance in the state. But Salina represents a part of the state that has not been on the crest of prosperity's wave. Local inhabitants say that they have had 4 poor years, but with the bumper wheat crop of 1914 the farmers have paid their old bills and have a little bank account remaining. But, better still, they are optimistic. The winter is most favorable, there being plenty of snow on the ground, which gives assurance that the subsoil will be well soaked and that in spite of dry weather a good crop for 1915 will be practically assured.

But farmers do not all buy Fords, Overlands, Buicks, Studebakers, Hups or Saxons, either fours or sixes. Primarily they want great power and with many the six is a synonym of power. The state has hills, clay roads and gumbo roads. These must be climbed preferably on high, à la Ford, and the six is attractive with not a few. One farmer this week signed his order for a $5,000 six, for seven passengers and painted white. He lives 9 miles in the country, and is the acknowledged social leader in his section. One company selling fours at over $2,500 puts 150 cars a year into the state.

For 1915 the farmer of Kansas is buying a slightly higher priced car. He is going up in the price scale. This does not mean fewer of the cheap cars but a widening of the medium-car market. Not a few with cheap cars last year are keeping these and buying cars listing at $1,000 or thereabouts. Some, and they are in considerable numbers, are buying $1,500 machines.

Kansas has 177,840 farmers, the average farm is 244 acres and the average value per acre $35.45. This means an average farm value of $8,649.80. This value per farm compares favorably with Illinois, where the average value of a farm is $12,267.08. Kansas outstrips the New York farmer, whose average land value is $283.68 per farm. Here are some illuminating figures on the average sizes of farms in some of the different states and their average value per acre:

State	Av. farm (acres)	Av. value per acre	Av. farm value
Kansas	244	$35.45	$8,649.80
Missouri	124.8	41.80	5,216.64
Oklahoma	151.7	22.49	3,411.73
Illinois	129.1	95.02	12,267.08
New York	102.2	32.13	3,283.68
Ohio	88.6	53.34	4,725.92
Connecticut	81.5	33.03	2,691.95
Nebraska	297.8	41.80	12,448.04
Iowa	156.3	82.58	12,907.25
Minnesota	177.3	36.82	6,528.19

But Missouri, and Oklahoma must not be overlooked as farmer states and also as car consuming centers. A dealer from Joplin, Mo., spoke with pride of over twenty farmers around that center who own farms of over 500 acres each, and each farmer financially able to own not one cheap car, but one or more cheap cars, one large car, a motor truck and a tractor for general farm work. Missouri

has 276,578 farmers and this is how these divide up as to acreage:

Farms between 50 and 100 acres....	74,178
Farms between 100 and 175 acres....	80,120
Farms between 175 and 259 acres....	32,109
Farms between 260 and 500 acres....	19,812
Over 500 acres	3,971

Here we have a total of over 200,000 farmers the majority of whom are in the field for cars of one type or another and all of whom hope some day to own automobiles, perhaps farm tractors and motor trucks.

But pass on to farm totals in the Kansas City distributing territory and here we have:

Farmers in Kansas.....	177,840
Missouri	276,578
Oklahoma	190,000
Part of Arkansas.....	70,000
	714,278

Gasoline cars have not the entire field, the electrics, modest and lady-like as they are, are making a louder noise and now it is becoming customary to discard the old bell signal and install the electric horn. Kansas has 290 electrics throughout the state, add to this 120 in Oklahoma and 145 in rural Missouri and you have the electric totals outside of the three leading cities St. Louis, Kansas City and St. Joseph, Mo. Here are figures from registrations:

Kansas City	1,200
St. Louis	800
St. Joseph	40
State of Kansas.....	290
State of Missouri.....	145
State of Oklahoma.....	120
Total	2,595

In Kansas City the electric passenger car seems a paradox. Before getting off at the big new Union Station and you see the skyscrapers perched on the tops of the myriad hills, with macadam ribbons as streets forming roller coaster divisions, you imagine that the electric is not here, but you are pleasantly disappointed. Kansas City must be counted as a good electric town. Omaha with hills not the equal of those here does not pretend to use electrics. But here the electric has mastered the hills. Women drive them here and drive them summer and winter, up and down hill. The closed car is everywhere, in fact, the roadster or cabriolet type is not in demand. When asked why the electric had such a favorable hold here one dealer replied: "With our hills it is much more difficult for a lady to drive a gasoline car here than in Chicago or Minneapolis. The difficulty comes with stopping the gasoline cars going up hills and having to release the brakes and engage the clutch when starting. With the electric driving is much simpler. The excellent 350 miles of oiled macadam roads lying in the surrounding country has had much to do with the increasing popularity of electrics.

During the last year the cheaper coupé type of gasoline car has been the biggest rival of the electric. This promises to continue and each week sees some user of an electric buy a gasoline coupé and vice versa some gasoline car user discontinue it and adopt the electric.

Throughout the State of Kansas and also in Missouri the electric is invading the smaller cities and towns. Thus Topeka, the capital city, has fifty electrics, Wichita has over 100, and Independence sixty-seven. In Missouri the same holds true. There are sixty in Springfield and in Kirksville, a town of 2,000 without a single paved street, there are four electrics.

The Improvement of Spring Systems—VII

(*Continued from page* 323)

obstacle. Schemes for a tire capable of moving on the wheel rim against a frictional resistance seem fantastic. To shackle the ordinary spring at the front only has, curiously enough, been repeatedly tried, but it results only in snapping leaves in the rear half of the spring. Moreover, it could not be expected to give shock-relief unless the rear half were formed with a yielding scroll. The scroll might better be in front with the shackle in the rear, and this might give acceptable results if a crosswise steering-rod is used, especially in connection with air tires, which could then be strongly inflated—a desideratum now sacrificed for comfort.

A Solution Worth Trying

A better solution may be found by adopting an obliquely receding spring movement, with all extension of the spring sharply checked beyond its initial position. Fig. 21 shows that a design of this nature could be made to agree with the steering requirements even if a lengthwise-acting steering-rod is used. By having the front end of the spring longer and more flexible than the rear, the axle would follow the path BP instead of CA, which would permit the steering-rod to follow its natural curve CS without forcing it out of any adjustment given it before or during the shock. The lower portions of CA and CS would be annulled by the rebound check D. Devices checking spring extension with exact reference to the initial static position of the spring, irrespective of changes caused in this position by load changes, can easily be made, though they are not in the open market.

Two Universals Needed

Point 5, relating to lateral cushioning of some kind not conducive to rolling of the vehicle body, was left open, and the same may be done here, for two reasons: First, when springs are shackled at both ends they can be flat or curved and give horizontal movement in either case, and torsion of the spring may therefore be enlisted in any desired degree. Secondly, the movements demanded for lateral cushioning are so small that materials and workmanship will determine results as much as design.

Any special arrangement for preventing the axle from skewing under the influence of a shock affecting only one of a pair of wheels, and thereby perhaps wrenching the differential or the worm gear, would be superfluous, it was understood, as any momentary skewing in the horizontal axle plane would mean only an emphasized need of two universals on the drive-shaft, and this is now the preferred construction. The need is shown in an exaggerated way in Fig. 22, where A is the front universal and B the rear one which becomes indispensable when thrust rod springs permit one wheel to be momentarily a trifle in advance of the other.

(*To be Continued*)

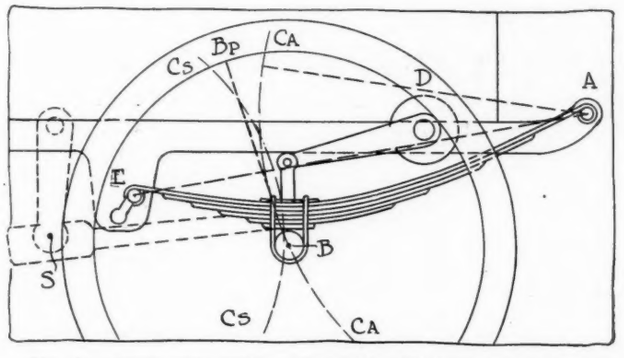


Fig. 21—Front axle spring suspension, with rebound check of special type; arranged obliquely on line AE to absorb both vertical and horizontal shock components directly. Proportions diagrammatic. Longer steering rod would help straighten Cs

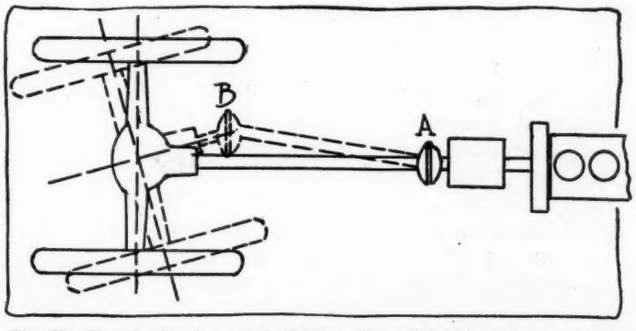


Fig. 22—Sketch showing need of two universal joints on drive shafts when axle can yield unevenly in horizontal plane

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Distributors vs. Dealers

FROM present problems entering into the merchandising of automobiles it seems probable that a clearer line of demarcation will be drawn between the field of the distributor and that of the dealer in the near future. In many large distributing centers the car representative is a combination of distributor and dealer; a part of his product he wholesales to his dealers in the surrounding counties and states, and the remaining fraction he sells at retail in his own city. It is in combining these two functions that the possible rift lies. In older mercantile lines the wholesale house and the retail house are separated. If the same money controls a large wholesale and retail business in the same city, they are in separate buildings, the wholesale one in the jobbers' section and the retail store in the shopping center.

In the automobile field in certain cities abuses are creeping in where wholesale and retail business are combined in one store. One is that the distributor, or the wholesaler, cuts prices on much of his retail business, the advanced reason being that he prefers the distributing end to the retailing one, and in his retail trade he is content if his profit is little greater than on his wholesale business. Such a condition makes it very difficult for the other dealer in that city having only a local territory and being only a retailer. He is brought face to face with cuts in prices and long allowances on trades.

If the distributor were only a distributor he would carry on his business in a different city location from the retailer, in streets where rents and overhead are much lower. This would also result in smaller places for the retailer, who would not have to carry so many cars in stock and would have other advantages.

Service

SERVICE has ceased to be a form of charity on the part of the maker. It has become openly a part of the business organization as much as the selling of the car itself. The automobile salesman has been drilled by his company and has been led by the inquiries of the buying public to talk service. But it is only a recent development which allows the maker to come out frankly and state that he is in the parts-making business as well as in the car-selling business.

To put the parts department on a business basis it must be a complete organization within itself. It must have a head. Its work must be departmentized and systematized so that when the order comes for a given part it must not cause a scurrying to and fro of people who happen to come in touch with the order but, on the contrary, must pass through the same orderly channel of administrative and productive organization that occurs when an order comes for a finished car. The machinery for the work must be adequate and must not conflict with that of the regular production. Costs must be kept down to the limit and fixed duty for fixed machines, for fixed areas and for fixed men are the only way in which this can be done. Recognizing this, the separate plant is the best solution, although if the organization itself is kept away from the regular manufacturing end, the main requirements will be successfully met.

The men in control of service work must concentrate on that if the best results are to be obtained. It is as bad for a man to be adjusted for a fresh line of duty to meet momentary changes in conditions as it is to alter the entire set-up on a machine to meet the fluctuations from standard production to parts production. Organization and systematized control are the necessities for preventing the price list in the parts book from assuming uncouth proportions.

The Farmer

IT seems a far cry from the farmer to the designing engineer but it is the farmer who is making the engineer bend his best efforts towards the production of a powerful and reliable car at $1,000.

Returns from the Minneapolis and Kansas shows illustrate this fact emphatically. Estimates based on careful observations indicate that 37,000 cars will be sold in the Minneapolis territory. During 1914 $39,000,000 worth of cars and accessories were disposed of through the territory centering in Kansas.

The farmer wants a powerful car for $2,000 at the utmost and $1,200 is closer to his purse. This, then, is the problem which the farmer puts to the automobile designer.

Zimmerschied Is Chairman of S. A. E. Standards Committee

Metallurgist Accepts Appointment by the Council and Succeeds Henry Souther —Committee Personnel To Be Announced Shortly

NEW YORK CITY, Feb. 16—K. W. Zimmerschied, Chief Metallurgist of the General Motors Co., has been elected chairman of the Standards Committee of the Society of Automobile Engineers. Mr. Zimmerschied has accepted his appointment by the council and will immediately preside over the activities of this important branch of the Society. Mr. Zimmerschied succeeds in office Henry Souther who resigned at the last winter session in order to devote himself to the Ferro organization of which he is a member.

K. W. Zimmerschied, new chairman of the Standards Committee of the Society of Automobile Engineers.

Mr. Zimmerschied has been active in the affairs of the Society for a number of years having been during the year of 1914 a member of the Iron and Steel Division of the Standards Committee and holding the office of second vice-president during that year. The work of the Standards Committee will be actively pushed and the policies developed under Mr. Souther's administration will doubtlessly be continued. It is the aim of the organization to bring the members of the Standards Committee together at least four times a year and the mileage expenses of the members of the committee are paid. The work in hand is far reaching and the committee has under consideration many standards that will cut cost of manufacture in several branches of the industry. The new personnel of the committee will be announced shortly.

Australian Trade Recovering —Trucks Scarce

NEW YORK CITY, Feb. 8—Throughout Australia, with the exception of South Australia, the automobile trade is improving; stock values have recovered greatly since the reopening of the Exchange and, though the position is by no means the same as previous to the war, still people are beginning to spend money once more. Naturally the demand for high-priced cars is very small, not only because of the stringency of the times, but because the new taxation which lately came into force taxes individuals more highly. Added to general taxes that have the effect of raising the cost of living, there are special automobile imposts varying from $10 to $50 according to size. The most popular pleasure car just now should be the medium and low-priced four which is inexpensive to run as well as to purchase. It is not expected that the Australian public will take a strong liking for the eight cylinder.

In the truck field things are particularly bright, since the large number of users who have lost their vehicles to the government—for despatch to the seat of war—will buy anything capable of doing the work. Several American makers are already on the spot and are doing good business with trucks of medium size.

To give some idea of the wealth of the district from Ballina to the Tweed River which takes in 60 miles of coastline and averages about 20 miles inland, the amount paid by the butter factories to the farmers in that district for butter last month was over $1,000,000. The demand from these factories is the same the whole year round. Of course, it does not include pigs, cattle, horses, hides, sugar-cane, poultry and eggs, and also it does not include the Byron Bay butter factory, which is the largest in the world. This factory turns out over 1,000 tons of butter a month.

The wealth of Queensland is precisely the same, and more in the Charters Towers and Townsville district on account of the huge meat preserving and exporting works erected there.

As Queensland is a wealthy country, and not due to manufacturing business, it can be plainly seen that the whole of the wealth comes from the worker on the land, and this is the man who buys cars and forms a large proportion of the 79 per cent. of the cars that go into the country districts.

S. D. Waldon Goes to Cadillac

DETROIT, MICH., Feb. 16—Sidney D. Waldon, vice-president in charge of forework and current engineering of the Packard Motor Car Co., has severed his connection with that company to join the Cadillac Motor Car Co., where his duties largely will be in an advisory capacity in the engineering department as well as in assisting the management in a general way. Jesse G. Vincent, chief engineer of the Packard company, has been appointed vice-president for engineering to succeed Mr. Waldon. Associated with the Packard organization practically since its inception, having joined it in 1902, when the concern was still in Warren, O., Mr. Waldon advanced from almost the bottom of the ladder to sales manager, general manager and vice-president in turn. He is today one of the big figures in the industry. Mr. Vincent came to the Packard company in 1912, having previously been associated with the engineering work of the Hudson Motor Car Co.

Automobile Insurance Rates Reduced

NEW YORK CITY, Feb. 15—The automobile committee of the Workmen's Compensation Service Bureau has completed the work of revising the automobile experience, furnished by individual companies, and as a result new schedules of liability rates for pleasure cars will be issued at once and will become effective March 1. These will be effective throughout the country, except in Chicago where new rates went into effect Monday of this week. These are the same as the old rates for cars up to 20 horsepower and on higher horsepowers reductions of from $1 to $10 from the former manual have been made. New rates for commercial vehicles for the whole country, except the following cities, will be issued later: New York, Chicago, Boston, Providence and St. Louis. Property damage and collision insurance rates are unchanged.

Croxton Plant Sold for $25,500

WASHINGTON, PA., Feb. 13—The plant and property of the Croxton Motor Car Co., were sold at sheriff's sale today for $25,500 to J. I. Brownson, A. M. Linn and J. D. Bigger, trustees of the guarantee fund of the Washington Board of Trade.

Overland Plant is Rushed to Capacity

Full Force of 8,600 Men Works 24 Hours a Day— Unfilled Orders Increase

TOLEDO, O., Feb. 13—The Willys-Overland Co. reports that the week ending February 13 was the largest single week the company has ever experienced. The Toledo factory is operating 24 hours a day with a full force of 8,600 men. The unfilled orders in the hands of the Overland sales department on February 6 were larger by 26 per cent. than those on hand on the same date of last year.

In New York City 145 per cent. more Overlands have been required to meet the demand since the start of the fiscal year on July 1. In Washington the increase is 125 per cent.; in Boston, 110 per cent. and in Philadelphia 70 per cent.

A little farther to the west Cleveland shows a healthy increase of 130 per cent.; Pittsburgh follows with 80 per cent., and Toledo 60 per cent. In the middle west, Chicago, which ranks as the third largest of the 4,000 Overland dealers, shows a growth in sales of 64 per cent. Kansas City, the second largest Overland distributing point, is using half again as many cars as it did during the same period of last year. Milwaukee is running one-third ahead of its record of a year ago.

NEW YORK CITY, Feb. 15—The Willys-Overland Co. reports to the New York Stock Exchange for the 5 months ended November 30, 1914, as follows:

Profits for period after deducting maintenance, depreciation, etc.	$3,308,255
Interest	126,582
Net income	3,181,672
Preferred dividends	82,618
Common dividends	600,000
Retirement of preferred stock	83,333
Surplus	2,415,722

Moon's Jan. Business Gains 28.24 Per Cent.

ST. LOUIS, MO., Feb. 15—The Moon Motor Car Co. reports a gain of 28.24 per cent. during the month of January just passed, with the corresponding month last year. The shipments of 1915 models during the first month of this year were valued at $347,912.07 as against $271,278.47 during the same month in 1914, which is a gain of $76,633.60.

Buffalo Concerns Increase Working Force

BUFFALO, N. Y., Feb. 16—The Pierce-Arrow Motor Car Co., which ordinarily employs about 5,000 workmen when running at full capacity now again is running full time and the force of workmen gradually is being increased. Local selling agents for various motor companies now are reporting constantly increasing sales. The American Automobile Body Co., of Buffalo, has received a contract to construct for the Franklin company 3,000 automobile bodies. This contract is one of the largest made this year and in order to execute the contract a large force of workmen will have to be maintained for about 1 year.

SYRACUSE, N. Y., Feb. 15—A great increase in orders and business generally is reported by the Brown-Lipe Chapin Co., whose bevel gear and differential plants are very active at present. The Brown-Lipe Gear Co. also reports an increase in demand for complete transmissions. Both concerns anticipate a busy season.

National Carbon's Income $2,215,880

NEW YORK CITY, Feb. 15—The National Carbon Co., which closed its fiscal year on December 31, 1914, reports a net income of $2.215,880.18. Out of this income the company disposed of $372,750 on preferred stock dividends: $582,930 on common stock dividends; charges for depreciation, $389,-872.70; reserve for bonus to employes, subscribers to common capital stock, $25,000; customers' accounts written off, $19,708.78; and a balance credited to the profit and loss account amounting to $825,618.70.

The company now has ten factories in operation which are manufacturing lighting carbons, carbon brushes, carbon electrodes, carbon specialties, wet batteries, flashlights and flashlight batteries, standard dry batteries, storage batteries, electric starters, automobile accessories and specialties. The company is completing a large new factory in Long Island City, which will furnish for the American Ever Ready branch increased facilities.

Under the authority of a resolution adopted by the stockholders at their meeting on February 16, 1914, the executive committee offered to the company's employes the 5,000 shares of common capital stock set aside for that purpose. The plan of distribution provides that faithful employes are entitled to subscribe for the stock at par, and that they shall be given from 3 to 5 years in which to complete their payments. A bonus of $5 per share per year will be credited to the accounts of employes who are subscribers, for service during the 5 years over which the profit sharing plan extends. Subscriptions have been accepted from 1,264 employes.

Automobile Securities Quotations

NEW YORK CITY, Feb. 16—The general tone of the automobile securities market during the past week was considerably stronger than that which prevailed during the preceding period, only a few of the stocks showing a decline in value. Kelly-Springfield Tire and Maxwell were both strong while many other gains were recorded. Some of these might be mentioned as follows: Kelly-Springfield Tire common, 1 point first preferred, 2, second preferred, 5; Maxwell common, 5 1-4, first preferred, 3-4, second preferred, 1 3-4; Portage rubber common, 4, preferred, 5; and Packard preferred, 2.

	1914 Bid	1914 Asked	1915 Bid	1915 Asked	Net Ch'ges
Ajax-Grieb Rubber Co. com	200	..	250	..	..
Ajax-Grieb Rubber Co. pfd	99	102	100	..	..
Aluminum Castings pfd	97	100	95	100	..
J. I. Case pfd	..	..	..	85	..
Chalmers Motor Co. com	85	90	..	94	..
Chalmers Motor Co. pfd	92	94	91	94	..
Electric Storage Battery Co	..	..	48	49	+ ½
Firestone Tire & Rubber Co. com	270	276	370	376	..
Firestone Tire & Rubber Co. pfd	109	110½	108	110	—1
General Motors Co. com	60⅛	64¾	94½	95	+1
General Motors Co. pfd	89½	90	95	96	+ ½
B. F. Goodrich Co. com	23½	24	31	32	—1⅜
B. F. Goodrich Co. pfd	88	90	96	97	+ ⅝
Goodyear Tire & Rubber Co. com	210	218	191	194	+1
Goodyear Tire & Rubber Co. pfd	96½	98	101	102	..
Gray & Davis, Inc., pfd	90	97	..	..	..
International Motor Co. com	..	5	..	..	..
International Motor Co. pfd	..	15	..	..	..
Kelly-Springfield Tire Co. com	..	..	108	110	+1
Kelly-Springfield Tire Co. 1st pfd	..	..	84	85	+2
Kelly-Springfield Tire Co. 2d pfd	..	..	122	127	+5
Maxwell Motor Co. com	5	5½	22½	23½	+5¼
Maxwell Motor Co. 1st pfd	27	27½	59	60	+ ¾
Maxwell Motor Co. 2d pfd	8½	9	24	25	+1¾
Miller Rubber Co. com	..	..	150	156	—8
Miller Rubber Co. pfd	..	..	101	103	..
New Departure Mfg. Co. com	120	124	118	123	+1
New Departure Mfg. Co. pd	103	106	105½	106½	+ ½
Packard Motor Car Co. com	..	..	..	99	..
Packard Motor Car Co. pfd	94	98	95	..	+2
Peerless Motor Car Co. com	15	25	13	20	..
Peerless Motor Car Co. pfd	75	80	..	55	..
Portage Rubber Co. com	..	40	34	36	+4
Portage Rubber Co. pfd	..	90	85	95	+5
*Reo Motor Truck Co	7½	8¼	11¾	12½	+ ⅛
*Reo Motor Car Co	17¾	18¼	24¾	25½	+ ¼
Splitdorf Electric Co. pfd	40	50	..	..	..
Stewart-Warner Speed. Corp. com	55	56	51½	53½	+2
Stewart-Warner Speed. Corp. pfd	98	99½	101	103	+ ½
Studebaker Corporation com	26½	27⅛	45	46	—1⅞
Studebaker Corporation pfd	84½	86½	95	96	+1
Swinehart Tire & Rubber Co.	70	72	71	73½	+2
Texas Company	..	..	132	133	+1
U. S. Rubber Co. com	59¾	59¾	56	57	+ ¼
U. S. Rubber Co. pfd	101¾	102	103	104	+ ¼
Vacuum Oil Co	214	218	188	192	—4
White Company pfd	105	110	103	110	—5
Willys-Overland Co. com	64	66	95	97	—1½
Willys-Overland Co. pfd	92	95	95	96	..

*Par value $10; all others $100 par value.

Uninterrupted Service for Krit Owners

DETROIT, MICH., Feb. 15—Within the next 10 days Samuel Winternitz & Co., Chicago, who purchased the assets of the bankrupt Krit Motor Car Co., and of the Krit Sales Co., will announce the new officers of the re-organized Krit Motor Car Co., the business of which will be continued in the present plant. A letter has been sent to the dealers which reads partly as follows:

"We are not in a position just yet to advise you the exact plans regarding the marketing of cars for 1915. We hope, however, to be able to give you definite information very shortly. In the meantime, the service department will be carried on the same as before the receivership. Krit dealers will receive the same discounts and in every way will be taken care of the same as before the period of reorganization. The terms of cash in advance, which have governed

Market Reports for the Week

NEW YORK CITY, Feb. 17—Market prices this week were more or less steady. There were, however, a few changes which were of importance. Kansas petroleum came down from $0.55 to $0.40 a barrel and antimony and lead went up $0.01 1-2 and $0.05, respectively. Tin closed at $36.13 per 100 pounds at a gain of $0.38. The rest of the metals and oils and lubricants experienced no changes. The copper demand was light in both the domestic and foreign markets, with prices, except for jobbing lots, almost entirely nominal. Rubber continues firm with an increased demand reported from the manufacturers. The market retained a firm tone and prices were in all instances apparently well maintained.

Material	Wed.	Thurs.	Sat.	Mon.	Tues.	Week's Changes
Antimony	.17	.17	.17	.18	.18½	+.01½
Beams & Channels, 100 lbs.	1.21	1.21	1.21	1.21	1.21	.....
Bessemer Steel, ton	18.50	18.50	18.50	18.50	18.50	.....
Copper, Elec., lb	.14½	.14½	.14½	.14½	.14½	.....
Copper, Lake, lb	.14⅝	.14⅝	.14⅝	.14⅝	.14⅝	.....
Cottonseed Oil, bbl	7.05	7.12	7.11	7.10	7.15	+.10
Cyanide Potash, lb	.21	.21	.21	.21	.21	.....
Fish Oil, Menhaden, Brown	.41	.41	.41	.41	.41	.....
Gasoline, Auto, bbl	.12	.12	.12	.12	.12	.....
Lard Oil, prime	.92	.92	.92	.92	92	.....
Lead, 100 lbs	3.80	3.80	3.80	3.80	3.85	+.05
Linseed Oil	.60	.60	.60	.60	.60	.....
Open-Hearth Steel, ton	18.50	18.50	18.50	18.50	18.50	.....
Petroleum, bbl., Kans., crude	.55	.45	.45	.45	.40	—.15
Petroleum, bbl., Pa., crude	1.50	1.50	1.50	1.50	1.50	.....
Rapeseed Oil, refined	.75	.75	.75	.75	.75	.....
Rubber, Fine Up-River, Para	.58	.58	.58	.58	.58	.....
Silk, raw, Ital	..	3.90	..	3.90	3.90	.....
Silk, raw, Japan	..	3.37½	..	3.72½	3.35	—.02½
Sulphuric Acid, 60 Baume	.90	.90	.90	.90	.90	.....
Tin, 100 lb.	35.75	36.25	36.25	36.25	36.13	+.38
Tire Scrap	.05	.05	.05	.05	.05	.....

all the shipments for the past 6 weeks have been lifted. In the future, all shipments will be made on a C.O.D. basis."

American Steel Foundries Enter Field

CHICAGO, ILL., Feb. 15—The American Steel Foundries have established a department especially for handling the business of automobile builders in connection with the general steel castings used in construction, and especially their new types of steel wheels.

H. K. Gilbert, Fisher Bldg., Chicago, has been appointed special sales agent for this department.

English Dealer Here for Car Agencies

NEW YORK CITY, Feb. 16—Guy Lewin, head of Guy Lewin, Ltd., London, landed here today. He will proceed at once to Buffalo, where he will be the guest of George Houk, the wire wheel manufacturer. He will then journey to Detroit where he will stay at the Hotel Statler. It is understood that Mr. Lewin is confident of his ability to do good business in England with American cars and accessories, and the immediate object of his visit to this country is to find new agencies for a car or cars selling for less than $1,000.

One of the first big dealers in the British automobile trade was Sir Charles Friswell who established a large depot in London and made from his business a considerable fortune. Some time ago on his retirement the concern passed into the hands of Guy Lewin, who was Sir Charles' chief of staff, and more recently on a reorganization of the whole business it became Guy Lewin, Ltd., instead of Friswells.

Diamond and Lee Reduce Tire Prices

NEW YORK CITY, Feb. 13—The revision of tire lists still continues though not all manufacturers have as yet been heard from. Since last week, two more makers have announced revised lists, these being Lee and Diamond. The new lists, together with the old ones on some of the more popular sizes are given herewith.

The list of makers who have revised their schedules following the revision made by Goodrich now includes Braender, Firestone, Fisk, United States, Goodyear, Kelly-Springfield, Ajax and Pennsylvania. The companies which have not yet made formal announcement include Batavia, Federal, Miller, Republic and some others. Lee and Diamond changes are given in the table, both former and present prices being given:

		30 x 3		32 x 3½		34 x 4		36 x 4½	
Lee	Plain	$9.45	$12.40	$14.05	$17.75	$20.40	$25.85	$28.80	$37.10
	Non-skid	13.15	16.60	20.40	24.70	27.40	33.10	40.20	50.20
	Plain P. P.	18.45	20.15	25.50	28.35	34.45	38.25	44.80	49.75
	Non-skid P. P.	22.15	25.15	31.85	36.30	41.45	47.00	56.20	64.95
	Tube	2.75	3.25	3.30	4.55	4.70	5.75	6.10	7.60
Diamond	Plain	9.00	11.70	13.35	16.75	19.40	24.35	27.35	35.00
	Non-skid	9.45	12.65	14.00	18.10	20.35	26.05	28.70	37.10
	Tube	2.35	2.80	2.80	3.70	4.00	4.90	5.20	6.45

Iowa Registration Doubles in 2 Years

Increase of 34,000 Cars Made Over 1913—Big Crops Predict 1915 Will Be Banner Year

DES MOINES, IA., Feb. 15—Statistics of Iowa's automobile growth, just issued by the state insurance department, show that the automobile population of the state has almost quadrupled in 3 years, that it has more than doubled in 2 years, and that the increase of 1914 over 1913 was more than 34,000. Following this period of remarkable growth, it is predicted that the present year will be the greatest automobile year in the history of the state because of uniformly favorable conditions, an excellent financial situation, and the universal interest in the automobile.

The automobile registration for Iowa in 1911 was 28,131; in 1912, 44,628; in 1913, 71,717; in 1914, 106,087.

Every indication points to larger automobile sales in Iowa in 1915 than in any previous year. Iowa people never had so much money in their pockets as now. Last year's crops, which, according to the Iowa Dept. of Agriculture, were worth $357,819,300, are $50,000,000 more in value than the crops of 1913 and $89,000,000 in value over the crops of 1912. Much of last year's crops is still on hand and moving at war time prices.

War conditions have had no bad effect on Iowa. The increasing prices of food stuffs are just what the Iowa farmers want for it is food stuffs that they have to sell and the result is that Iowa prosperity is greater, perhaps, now than at any previous time in the history of the state.

Ky. 1914 Registrations Increase 64 Per Cent.

LOUISVILLE, KY., Feb. 15—During 1914, the automobile experienced its most prosperous year in Kentucky, the registrations in the office of the Commissioner of Motor Vehicles showing an increase over 1913 of automobiles alone of 62 per cent. and if motorcycles are included the increase is 73 per cent. According to Hugh Ramsey, deputy commissioner of Motor Vehicles, there will be 20,000 machines registered in this state by January 1, 1916.

15,000 Pennsylvania Farmers Own Cars

YORK, PA., Feb. 13—Seven per cent. of the farmers of Pennsylvania own automobiles according to the figures compiled by L. H. Wible, chief of statistics of the Pennsylvania Department of Agriculture, from reports made to him from every county in the state. It is estimated by him that at least 15,000 automobiles are owned on farms and they are employed not only for getting about to make purchases and for pleasure, to go to church and meetings, but for marketing and hauling purposes. It is his belief that this year will see a big increase in the number of automobiles owned by farmers, who are getting good prices now and for whose use many makes of cars are being manufactured.

CHICAGO, ILL., Feb. 15—Registrations in the state of Illinois during 1914 amounted in number of 131,140. There were 18,000 licenses granted to chauffeurs.

Fisk Adds $500,000 Preferred Stock

CHICOPEE FALLS, MASS., Feb. 12—The stockholders of the Fisk Rubber Co., at a meeting held on February 10 in this city, authorized an additional lot of $500,000 preferred stock, which will be sold for the company on commission by a Boston banking house. The proceeds of the new stock will be used for additional working capital.

France Our Best Customer in December

Buys 969 Motor Vehicles—United Kingdom Second with 850—No Cars Shipped to Germany or Italy in That Month—Detailed Export Statistics

WASHINGTON, D. C., Feb. 13—Supplementing the general figures of exports of motor cars during December and the calendar year ending that month, as published in last week's issue of THE AUTOMOBILE the following detailed figures will be found of interest to the automobile trade.

The feature of the month's export business was the large number of trucks shipped abroad, the number being 1,279 and the value $3,387,729. For the 12 months' period the number of commercial cars exported was 3,430, the value of which was $8,985,756. This was a tremendous increase over the corresponding figures for 1913, which showed that during December of that year eighty-eight commercial cars were exported, the value being $100,660, while during the calendar year the number was 1,009 and the value $1,686,807.

On the other hand exports of pleasure cars showed a marked decrease. In December, 1913, the number shipped abroad was 2,301, valued at $2,052,484, while in December last the number had fallen to 1,297 and the value to $998,698. During the calendar year the shipments dropped from 25,880, valued at $25,343,644, in 1913, to 22,335, valued at $19,521,708, in 1914.

France was the largest purchaser of cars from this country during December, that country taking 969, valued at $2,588,622. The United Kingdom was second with 850 cars, valued at $1,097,007, while third place was taken by British Oceania, with 285 cars, valued at $222,975. No cars were shipped to either Germany or Italy during December, while in December a year ago Germany imported 58 cars from this country, the value of which was $45,810, while Italy's purchases amounted to 12 cars, valued at $11,236. The war conditions are also reflected in Mexico's purchases of cars from this country, only 7 being shipped to that country in December last, the value of which was $9,660, while in December a year ago the number was 14, and the value $21,254.

Looking over the year's export business the figures show that the United Kingdom was our largest purchaser of cars, taking 6,799 machines, valued at $6,891,511 during the 12 months of 1914. Other large buyers of American cars during the year were Canada, with 4,214 cars, valued at $5,347,547; France, 2,816 cars, valued at $5,099,425; British Oceania, 3,475 cars, valued at $2,955,825; various European countries not separately enumerated, 2,785 cars, valued at $3,411,100; Asia and other Oceania, 1,454 cars, valued at $1,425,556.

The detailed figures of exports for the periods under consideration are given in the accompanying table.

German Bearing Embargo Reported

NEW YORK CITY, Feb. 15—It is reported that Germany has placed a total embargo on the exportation of ball bearings. If this be true, that this will seriously affect the business of importers in this country is the opinion of the majority of those engaged in this business. It is stated by several that considerable difficulty is had even at the present time in securing bearings of certain sizes from the countries at war. These are generally the larger bearings and according to one importer, notably in the sizes having an internal bore of .75 or 1.5-inch. With this situation, as it stands and considering the probable effect of the embargo, it is certain that American makers or those dealing in bearings imported from other neutral nations will secure some of this business.

According to the Barthel and Daly company, the embargo is not likely to last long enough to seriously affect the stock of those who have prepared themselves for a shortage. The J. S. Bretz Co. states that it had heard nothing of such an embargo. Marburg Bros. are of the opinion that such an embargo would seriously affect the companies that are importing from the affected area with, of course, a corresponding rise in the business of those securing their bearings in America or unaffected countries. The Norma com-

Exports and Imports of Automobiles, Trucks and Accessories in December and Preceding 12 Months

EXPORTS	December 1913 Number	December 1913 Value	December 1914 Number	December 1914 Value	12 months ending December 1913 Number	12 months ending December 1913 Value	12 months ending December 1914 Number	12 months ending December 1914 Value
Automobiles:								
France	120	$100,418	969	$2,588,622	921	$710,149	2,816	$5,099,452
Germany	58	45,810	.....	.....	1,017	857,103	1,063	799,552
Italy	12	11,236	.....	.....	314	270,315	235	160,058
United Kingdom	648	484,299	850	1,097,007	5,152	3,966,600	6,799	6,891,511
Other Europe	160	136,183	27	29,436	1,846	1,571,678	2,785	3,411,100
Canada	227	307,170	128	189,466	6,051	8,177,256	4,214	5,347,547
Mexico	14	21,254	7	9,660	227	408,148	88	111,344
West Indies and Bermuda	72	70,166	96	67,716	527	515,762	646	525,062
South America	239	234,905	86	40,476	2,713	3,008,045	1,149	863,360
British Oceania	495	431,530	285	222,975	3,564	3,286,860	3,475	2,955,825
Asia and other Oceania	137	134,891	92	115,792	2,367	2,353,788	1,454	1,425,556
Other countries	207	175,282	36	25,277	2,190	1,904,747	1,041	917,097
Total	2,389	$2,153,144	2,576	$4,386,427	26,889	$27,030,451	25,765	$28,507,464
Tires:								
Belgium	...	.....	.....	.....	.....	$99,061	.....	$301
Germany	..	$16,022	.....	.....	.....	441,795	.....	81,917
England	...	162,113	.....	$182,852	.....	1,392,907	.....	1,458,777
Canada	...	44,053	.....	14,526	.....	1,134,110	.....	866,999
Mexico	...	4,936	.....	6,341	.....	148,258	.....	76,581
Philippine Islands	...	14,717	.....	16,366	.....	143,724	.....	156,235
Other countries	...	53,633	.....	80,811	.....	550,833	.....	674,306
Total	...	$295,474	.....	$300,896	.....	$3,910,688	.....	$3,315,116
IMPORTS								
Automobiles:								
France	22	$56,187	7	$16,107	196	$467,167	71	$150,600
Germany	1	3,570	.....	.....	81	214,701	12	21,979
Italy	5	9,240	.....	.....	85	153,039	106	115,718
United Kingdom	6	16,990	5	16,107	54	161,667	60	153,413
Other countries	4	7,668	4	6,358	76	158,299	47	51,595
Total	38	$93,655	16	$38,572	492	$1,154,873	296	$493,305
Rubber, etc. Unmanufactured:								
Balata ....lbs..free.	194,304	$96,566	200,002	$74,712	1,508,946	$792,543	2,015,158	$880,214
Guayule gum...lbs..free.	37,981	23,057	742,169	215,904	4,870,203	2,129,681	2,275,540	789,560
Gutta-joolatong.lbs..free.	1,550,562	74,186	1,192,567	50,787	36,420,921	1,765,816	18,663,898	856,976
Gutta-percha ..lbs..free.	133,005	22,811	46,461	9,564	872,595	199,808	1,923,138	337,128
India rubber...lbs..free.	10,480,701	5,437,668	11,583,797	5,138,953	115,880,641	76,820,739	143,065,161	70,472,704
India-rubber scrap or refuse, fit only for remanufacture .lbs..free.	851,549	67,430	559,613	28,975	36,737,977	3,193,013	19,118,966	1,356,750
Total unmanufactured.	.....	$5,721,718	.....	$5,518,895	.....	$84,901,600	.....	$74,693,332

pany states that the larger bearings are scarce but that no trouble, relatively speaking, has been had in bringing the smaller bearings into this country. According to this company, there is little doubt but that Germany will continue to allow the exportation of small bearings. The Riebe company states that, while certain sizes are missing, it is because the manufacturer has not been able to secure the raw material from the German mills because this material has been used for purposes other than the manufacture of bearings. This situation, it is expected, will be shortly relieved by supplies from the mills which will furnish their regular customers with chrome-nickel steel. The S. K. F. company states that there seems to be a shortage in the three-quarter and 1½-inch internal bore bearings.

The Rhineland Machine Works, who received a cablegram from Germany to the effect that this embargo had been declared, is of the opinion that no more ball bearings will be exported from that country, with the effect that German dealers here will be troubled by a shortage and the extra demand on the domestic makers will cause a rise in price. The Hess-Bright company had not as yet heard of the embargo, but owing to a large stock added to the bearings that are made in America, does not believe that the consequences will be serious.

Rubber Control Committee Appointed

NEW YORK CITY, Feb. 16—The Rubber Club of America has opened rooms in the Whitehall Bldg., 17 Battery Place, this city, to handle imports of rubber more readily. Sir Richard Crawford, the official representative of the British Government sent to the United States to handle the situation arising out of the various embargoes, recently called upon the club to aid in enforcing the agreements.

Immediately upon receipt of this information the executive committee of the club appointed a special committee to be known as the rubber control committee, which is constituted as follows: C. T. Wilson, chairman, C. T. Wilson Co., crude rubber importers; W. J. Kelly, Arnold & Ziess, 277 Broadway, crude rubber importers; B. G. Work, president of the B. F. Goodrich Co., Akron, O.; Henry Spjadone, president of the Gutta Percha & Rubber Mfg. Co., New York City; G. B. Hodgman, president of the Rubber Club of America and president of the Hodgman Rubber Co. of New York; W. E. Bruyn, president of the Rubber Trade Assn. of New York, of L. Littlejohn & Co., crude rubber importers, 129 Front street, New York.

In regard to shipments of rubber, it is reported that there is a great improvement since the lifting of the embargo. The first substantial shipment of plantation rubber from Great Britain since the lifting of the embargo was on the Menominee, which arrived last week with 22,000 cases, approximately 2,250,000 pounds, the greater part of which will be immediately put to use.

New Record in Petroleum Exports

NEW YORK CITY, Feb. 15—The United States exported in Great Britain in the last 3 months of 1914, 96,400,000 gallons of petroleum, or about 85 per cent. of the total which amounted to 103,000,000 gallons.

A new record was reached, total imports of petroleum products into the United Kingdom amounting to approximately 460,000,000 gallons, an increase of 35,000,000 gallons over the previous year and 105,000,000 above the 1912 figures. Of motor gasoline there were imported 120,500,000 gallons, nearly 20,000,000 more than in 1913, and of this quantity 57,000,000 gallons came from the far East and 43,000,000 from the United States.

In normal times England draws its petroleum supplies from four principal sources, America, East Indies, Russia and Roumania. In 1913 the United States and Mexico supplied 67 per cent., the far East 14 per cent. and Russia and Roumania 8 per cent. each. During the last 3 months of 1914 the United Kingdom drew practically all her supplies from America. Up to the end of September, England had received from the United States 229,000,000 gallons of petroleum products, and at the end of the year this figure had increased to 317,700,000 gallons, while from the far East only 5,000,000 gallons were imported during the last 3 months.

Petroleum production in the United States during 1914 amounted to 292,000,000 barrels, a gain of 13 per cent. over 1913, the production in that year amounting to 248,446,230 barrels.

NEW YORK CITY, Feb. 16—The officers and directors of the Electric Vehicle Assn. of America gave a dinner at Delmonico's last night to their past president, F. W. Smith. At the conclusion of the dinner, a surprise to Mr. Smith, an address was made by J. F. Gilchrist, of the Commonwealth Edison Co., Chicago, Ill., who succeeds Mr. Smith as president. J. H. McGraw, of the McGraw Publishing Co., and J. W. Lieb, vice-president of the New York Edison Co., made addresses, both speaking on the relation of the central station to electric vehicle development.

Sparks-Withington Wins Horn Suit

Court of Appeals Rules That Sparton Horn Does Not Infringe Hutchinson Patents

NEW YORK CITY, Feb. 12—Affirming the decision of the lower court, and dismissing the bill of complaint with costs, Judge Coxe of the U. S. court of appeals for the second circuit has handed down a decision in favor of the Garland Automobile Co. on the appeal made by the Lovell-McConnell Mfg. Co. It will be remembered that the Lovell-McConnell company brought suit against the Garland concern in the U. S. district court for the southern district of New York, charging infringement of three patents granted to Miller Reese Hutchinson covering horn construction, by the sale of cars equipped with the Sparton horn. The decision handed down in this court in favor of the Garland company was appealed by Lovell-McConnell.

In the appeal five claims were involved, three of patent No. 923,048, being claimed 17, 24 and 27, claim 22 of patent 923,049 and claim 47 of patent 923,122, all of which have to do with the construction and operation of the diaphragm and other elements in a horn, the frequency in amplitude of vibration of the diaphragm and the resulting alarm note being a feature.

In his decision Judge Coxe said, referring to the decision handed down last June against the Lovell-McConnell company and in favor of the Automobile Supply Mfg. Co., "All of these claims were in issue in the former action. In that case we reach the conclusion that 'the broad claims in controversy of the Hutchinson patents are invalid and the claims that cover specific details, if valid, are not infringed." Other statements made by Judge Coxe in his decision are:

"The only new evidence is a series of experiments by Professor Webster tending to show that the vibrations of the Klaxon diaphragm are different than those of the Pierman diaphragm. (Referring to the Pierman horn produced in evidence in the previous suits.) . . . These experiments show learning and ingenuity and are interesting from a scientific point of view but are too technical and refined for practical application to the peresent controversy. . . . In short, we think the test proposed . . . . too technical for a practical adoption in patent cases. It would, if permitted, enable the patentee to contend successfully, that, although his combination is shown in the prior art, he is entitled to a monopoly because he uses better material, because his machine is on a much larger scale and is more scientifically constructed than the one which preceded it. Conceding all that Professor Webster says to be true, we do not think it requires a modification of our former decision. If all the new testimony had been in the former records the result would have been the same."

In accordance with its announcement in February, 1913, to the effect that it would shield its clients in any suits brought against them because of using or selling Sparton horns, the Sparks-Withington Co., Jackson, Mich., fought the case for the Garland company.

TRENTON, N. J., Feb. 16—An amendment to the "Seven Sisters" anti-trust laws, designed to permit corporations to hold stock in other corporations for investment purposes only has been passed by the Senate.

TRENTON, N. J., Feb. 15—The bill which was introduced in the Legislature at Trenton by Assemblyman Peacock, seeking to repeal the present motor vehicle reciprocity law, was defeated by a vote of 11 to 44 on February 9. Assemblyman Oliphant, who was one who favored the bill, stated that the New Jersey roads cost the taxpayers of the State approximately $3,000 a year per mile to maintain.

Master to Pass on Carbureter Damages

DETROIT, MICH., Feb. 15—The statement made in the last issue of THE AUTOMOBILE in the report of the decision in the Stromberg-Zenith patent suit to the effect that the former company can collect a royalty on the two models of Zenith carbureters which Judge Sanborn held were infringements is misleading to a certain extent. The Zenith company points out that the matter has been referred to a master, who will pass upon the question of damages which the Stromberg company may have sustained by reason of this infringement and that not until such damages shall have been ascertained can the Chicago concern collect.

Orders Filed for 130 Army Trucks

Four Wheel Drive Increases Force—1,000 Motors Ordered—A Sleeve-Valve Eight

CLINTONVILLE, WIS., Feb. 15—The Four Wheel Drive Auto Co., Clintonville, Wis., has booked orders for 130 four-wheel-drive army cars for immediate delivery and is working its plant with increased forces. The company has placed an order with the Prime Steel Co., Milwaukee, for crucible steel castings which is the largest single order the Milwaukee concern has ever booked. The exact source of the big orders recently booked is not revealed, but is supposed to be both for American and foreign army account.

PORT HURON, MICH., Feb. 10—An order for 1,000 four-cylinder motors, 3 3-8 by 3 3-4, has been received by the Port Huron Construction Co., from the Regal Motor Car Co., Detroit. Another order for a large number of eight-cylinder motors for the same company has also been received. Both motors were designed by Sidney G. Jenks, general manager of the local manufacturing concern.

Pilliod Is First Sleeve-Valve Eight

TOLEDO, O., Feb. 12—The Pilliod eight-cylinder car which was shown for the first time in public at the opening of the recent annual local automobile show, in the Terminal building, is designed by C. J. Pilliod, a local mechanical engineer known as a designer of internal combustion engines and also as a railroad engineer.

The cylinders are cast in two blocks of fours, at an angle of 90 degrees and have a 3-inch bore and 5-inch stroke. The motor is of the sleeve type and there are no push rods or rocker arms. The bearings are adjustable. The carbureter is a Rayfield. The clutch is a cone. Water circulation is of the thermo-syphon type. The lubrication is non-circulating splash. The Atwater Kent ignition system is used. The starting system is the U. S. L. The Warner transmission is being used. Steering is on the left side with center control. The axles are Timken, full floating in rear. Semi-elliptic springs are used both on the front and rear. The wood wheels are fitted with 34 by 4 Congress tires. The frame is overslung in front and underslung in rear. The wheelbase is 120 inches and the tread standard.

For the present only one model will be made, a touring car for 5 or 7 passengers which will be listed at about $1,800, the price not having as yet been finally decided. The Pilliod Motor Co., which will build the cars, is located at 1212 Oakwood avenue.

Announce an Eight from Elwood

ELWOOD, IND., Feb. 12—Eight cylinders is the feature of the new Bailey-Klapp car, announced by the Elwood Iron Works Co., here. The price of the car and the complete details of the specifications have not been made public as yet, but it may be stated that the motor is a V-type, 3 by 4 inches in cylinder dimensions, A disk clutch, three-speed gearset and 54 inch rear springs are other features of the chassis. Upon the 116-inch wheelbase is fitted either a five or seven-passenger body, with one-man top and divided front seats. The manufacturer of the new eight also is making a four-cylinder car called the Elco 30.

A New Four-Cylinder Alter

PLYMOUTH, O., Feb. 12—The Alter car which has not been shown at the national shows and which is made by the Alter Motor Car Co., has a four-cylinder Golden, Belknap & Swartz motor, cast in pairs, with 3 3-4-inch bore and 4 1-4-inch stroke. Water cooling is per thermo-syphon system, the lubrication of the splash-pressure system. The Splitdorf ignition system has been adopted. The carbureter is a Holley, the clutch is of the disk in oil type. The front axle is a Timken, the rear axle a Walker-Weis semi-floating, the front springs are semi-elliptic, the rear springs three-quarter scroll elliptic. The wheelbase is 106 inches, the tread 56 inches. The wood wheels have 30 by 3 1-2 inches tires. Steering is on the left side with center control.

With regular stock equipment consisting of one man top, windshield, horn, speedometer, etc., and with the Remy starting and lighting system the price of either the two passenger roadster or of the five passenger touring car is $685. Without this system the price is $600.

BOSTON, MASS., Feb. 17—Plans have been made for a 2-day convention of electric car and truck manufacturers, agents, battery and lighting station officials during the Boston Automobile show. The first session will open on March 10, and headquarters will be established at the Boston City Club. Invitations have been sent to all companies identified with the electric vehicle interests and the officials of all the branches of The Electric Vehicle Assn. of America.

Another Synthetic Gasoline Announced

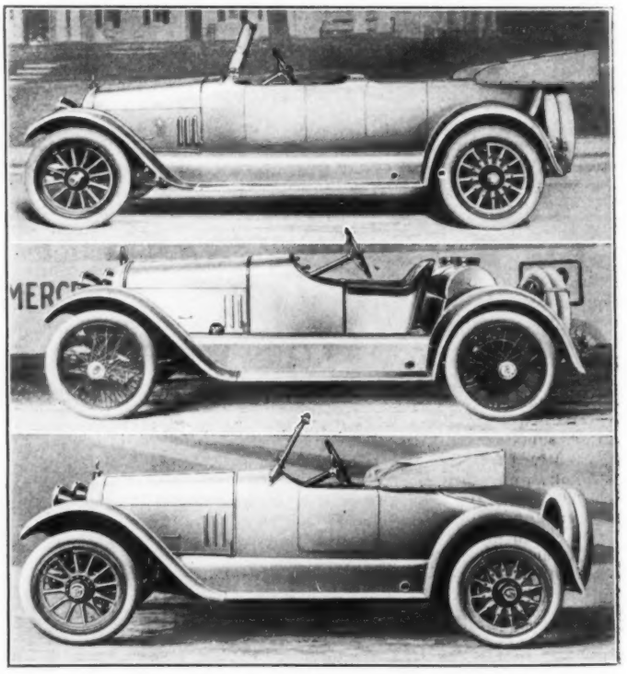
NEW YORK CITY, Feb. 16—Synthetic gasoline is again in evidence. A process for making gasoline out of "synthetic crude oil" has been discovered by Dr. W. O. Snellings, a research chemist of Pittsburgh, who was for many years in charge of explosive experiments for the United States Government. Announcement of the discovery was made at the 110th meeting of the American Institute of Mining Engineers, in the Engineering Bldg., 29 West Thirty-ninth street. Dr. Snelling has been experimenting for the last 5 years. It is not yet determined whether or not artificial fuel will undersell the natural.

NEW YORK CITY, Feb. 15—A new process for the extraction of gasoline from so-called "wet" gas, which is derived from the lower strata of oil wells, is reported as being in successful operation in California. This process, which may be described as fractional refrigeration, is the reverse of that employed in the distillation of petroleum, and consists in refrigerating the gas to a graduated scale of temperatures, the vaporized hydrocarbons with which it is saturated liquifying in rotation exactly as they are vaporized by heating the heavier oils. The temperatures can be closely regulated, and held at those points at which the various grades of gasoline will be condensed.

To Sell Automobiles at Auction

NEW YORK CITY, Feb. 13—The Motor Sales Corp., this city, and the Boston Auto Auction & Sales Co., Boston, Mass., will establish auction sales of automobiles, motorcycles, and accessories on an annual basis in their respective cities.

The local concern will hold a 3-day auction at Madison Square



THREE OF THE NEW MERCER 22-70 MODELS

Top—Six-passenger touring car. Note low effect. Middle—Two-passenger raceabout. Unlike most cars of this type, the upholstery is designed for comfort in everyday driving. The car has a guaranteed speed of a mile in 48 seconds. Bottom—Two-passenger roadster fitted with all the comfortable features of the larger models

Garden, starting March 22, having leased the building for the 3 days with an option of the same dates for the next 3 years. The Boston concern will hold auction sales every Tuesday, starting February 9, at 1105 Commonwealth avenue.

At the local auction, only individual owners of automobiles will be solicited to present their vehicles for sale, the management discouraging the entry of second-hand dealers into the conduct of the sale as much as possible.

An incline and running track will be built in the Garden and a demonstration will be given before such car is put on the block.

It is said that an option has been taken on the Chicago Coliseum by the management of the New York City corporation, and the same sale will be conducted in the West 1 week later. The names of the engineers and managers of the plan will be announced in a short time.

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DENVER, DEL., Feb. 15—A charter has been filed by the Missosan Tire Corp., capitalized at $3,000,000, to manufacture automobile tires. The incorporators are: S. S. Howard and H. O. Coughlin, both of New York.

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Meetings and Elections of Officers and Directors

NEW YORK CITY, Feb. 17—At the annual election of officers of the Motor Contest Dealers Assn., held in this city, today, all the old officers were re-elected. They are as follows: W. C. Poertner, president; E. Lascaris, first vice-president; E. C. J. McShane, second vice-president; treasurer, J. P. Nichols; and E. F. Korbel, secretary. Five new directors were elected to serve with the ten as follows: Horace De Lisser, I. M. Uppercu, W. P. Poertner, David Beecroft and S. S. Toback. The ten directors for 1915 are: E. F. Korbel, James Carpels, C. S. Wells, E. C. J. McShane, C. H. Larson, E Lascaris, J. C. Nichols, George Robertson, A. B. Cordner and W. J. Morgan.

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NEW YORK CITY, Feb. 16—The board of directors of the Automobile Trade Credit Assn. of this city has been re-elected to serve for the coming year. Carl Kaufman, of the U. S. Horn Mfg. Co. has been re-elected to the presidency and Franz Neilson as counsel and secretary-treasurer. The organization is devoted to the protection of the trade and credit interests of the local concerns in the accessory and other allied trades. During the past year, according to officers of the association, the complaint bureau has adjusted without recourse to law, 1,500 cases out of 3,000 who were not following the practices dictated by business ethics. The board consists of:

Carl Kaufman, U. S. Horn Mfg. Co., New York City; U. S. Kolby, American Ever Ready Works, New York City; D. D. Martin, Martin-Evans Co., Brooklyn, N. Y.; E. V. Nathan, Nathan Novelty Mfg. Co., New York City; F. B. Barnes, N. Y. & N. J. Lubricant Co., New York City; A. Waterman, Hartford Suspension Co., Jersey City, N. J.; W. O. Turner, Lovell-McConnell Mfg. Co., Newark, N. J.

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Barbour Pres. Ohio Electric Car Co.

TOLEDO, O., Feb. 15—Several changes among the officials of the Ohio Electric Car Co., were recently made. M. V. Barbour is now president of the company; and C. M. Foster, vice-president and general manager. Herman H. Brand, is secretary-treasurer. The board of directors is composed of the officers and J. F. Vogel, of the Gendron Wheel Co.; A. E. Baker, of Baker Bros.; Rathbun Fuller, attorney and H. E. Marvin, of Walding, Kinnan & Marvin, attorneys.

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HARTFORD, CONN., Feb. 13—The Hartford Auto Parts Co. has been reorganized insofar as its management is concerned, the following officers having been elected: President, Cyrus C. Chamberlain, treasurer of the Blakeslee Forging Co., Southington; vice-president and treasurer, James M. Carney; secretary and assistant treasurer, Harry W. Bigelow. These men, together with Edward D. Redfield, president of the City Bank of Hartford, Horace N. Ensworth, and John H. Trumbull, president of the Trumbull Electric Co., form the new board of directors. The company now has a large amount of business on hand and is operating day and night.

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DETROIT, MICH., Feb., 9—Officers of the United States Tire Co., and all the branch managers, all told thirty-two high officials, met in conference at the local offices of the company and at the plant of Morgan & Wright, to discuss business conditions, to outline the policy for the year and exchange views and ideas. From the views expressed by several branch managers from different parts of the country the general outlook for business is good and the indications are that this will be a big year for the automobile trade. Besides discussing business matters, the visitors spent a day at the Morgan & Wright plant to familiarize themselves more closely with all matters pertaining to the manufacturing end of the business.

Among those reported as in attendance were: E. S. Williams, president of the United States Tire Co.; M. Tucker, secretary to the president; George Shugart and O. S. Tweedy, western sales managers; Edward McMaster, manager manufacturing department; C. J. Butler, president Morgan & Wright; Joseph Weston, sales manager Charles Case, from the general offices, New York; William McMahan, factory manager, of Morgan & Wright, and the following branch managers: Colburn Standish, Detroit; F. B. Godloe, New York; Samuel Poor, Philadelphia; Edward Kidder, Boston; E. W. Tozier, Chicago; L. A. Brown, Kansas City; P. C. Anderson, Memphis; C. C. Gehring, Pittsburgh; P. Goodhall, Cleveland; Charles Gilbert, San Francisco; F. R. Burton, Atlanta; H. H. Hubbard, St. Louis; J. M. Ward, Indianapolis.

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INDIANAPOLIS, IND., Feb. 15—At the annual meeting of the Indiana Automobile Manufacturers' Assn. held at the Claypool Hotel, Indianapolis, on the evening of February 12, the following were elected directors: H. C. Campbell of the Stutz Motor Car Co.; Frank E. Smith, receiver for the Premier Motor Mfg. Co. and J. M. Ward of the United States Tire Co. It was decided to reduce the number of directors from nine to three.

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FINDLAY, O., Feb. 15—At the recent annual meeting of the Grant Motor Co., this city, the following officers were elected: D. A. Shaw, president; G. D. Grant, vice-president; G. S. Salzman, vice-president; and G. S. Waite, secretary.

The board of directors for the coming year will consist of D. A. Shaw, G. S. Waite, G. S. Salzman, G. D. Grant, C. A. Grant, R. R. Hall, A. E. Dorsey and J. M. Howe.

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ARDMORE, PA., Feb. 15—At the annual meeting of the Autocar Co., last week, the former board of directors was re-elected. W. W. Norton, who has been for several years superintendent of the factory, was elected a vice-president and will hold the position of production manager. The officers of the company who were re-elected are D. S. Ludlum, president; J. S. Clarke, vice-president; L. S. Clarke, vice-president; E. A. Fitts, secretary and treasurer, and F. C. Lewin, assistant secretary and treasurer.

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LOUISVILLE, KY., Feb. 11—At their annual meeting the stockholders of the Kentucky Wagon Mfg. Co., makers of the Urban and Old Hickory trucks, re-elected R. V. Board president, continued the present board of directors without change and heard gratifying reports on the volume of business during the past year.

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DETROIT, MICH., Feb. 15—At the annual meeting of the stockholders of the Detroit-Wyandotte Motor Co., manufacturer of the Horner trucks, Frank Marx was elected president; Herman Woelmer, treasurer; W. J. Seitz, secretary and George A. Horner, general manager. The business during the past year was declared to have been very satisfactory and it was decided to greatly increase the production this year.

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DETROIT, MICH., Feb. 9—District managers of the Chalmers Motor Co., will be here for a week or longer and will discuss all matters pertaining to the Chalmers business and the automobile business in general. They will be addressed by the heads of all the departments of the Chalmers organization and an exchange of ideas, suggestions and propositions will take place.

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DETROIT, MICH., Feb. 12—A first dividend of 10 per cent. has been ordered paid to the creditors of A. H. Kling & Co., automobile supply dealers, whose liabilities amount to $12,658.88. A second dividend also of 10 per cent. will probably be paid.

The creditors of the S. & M. Motor Co. will soon receive a dividend of 8 per cent., making 18 per cent. all told. The liabilities of the concern amounted to $12,570.02.

Both dividends were ordered paid by referee in bankruptcy Lee E. Joslyn.

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UTICA, N. Y., Feb. 13—The Divine Tire Co., Inc., at Utica, has filed a petition in bankruptcy in the U. S. court, this city. The concern owes $33,254, most of which is unsecured. Assets are placed at $162,663.

Jitneys Carry 45,000 Daily in Kansas City

Both Touring Cars and Buses Prove Practicability of 5-Cent Fare—Travel Is Found Uniform

KANSAS CITY, MO., Feb. 13—Kansas City is rapidly being jitneyized. After 3 weeks over 222 were registered this morning, this not including fifty or sixty that have already found the nickle pace too trying and have withdrawn. Yesterday 45,000 people were carried on jitneys, today that figure has been passed, and by the middle of next week conservatives say 50,000 a day will be carried in the four-, five- six- and seven-passenger cars, and the eighteen to thirty-passenger buses that carry the jitney sign on the windshield and on each side.

Stand at the headquarters of the Jitney Transportation Co. near the heart of the city for 5 minutes. Each minute from six to ten jitneys roll up to the curb, each loaded with five to seven passengers. The approach of each is heralded by the megaphone man who calls out the route and the destination. Each pauses for a few seconds, two or three get out, others take their place and the jitney is off on railroad schedule. Minute after minute, and hour after hour this caravan comes and goes, starting at 6.30 in the morning and stopping at 7.30 in the evening. After that hour all service is by special arrangement.

Jitneys Are Touring Cars

And these jitneys are just touring cars. Cars with a sign on the windshield "Grand Ave. and 12th to Prospect and 27th," or of other streets. There is a big 5 somewhere on the windshield and perhaps others on the doors. Within a week the jitney association hopes to have a standard street sign that will be illumined at night and which can be readily attached to any car. In addition to the designation of the route it will contain a large 5 and a serial number as registered by the jitney association, in order to facilitate checking at different depots.

Anyone with a car can become a jitney operator. A dollar a week is needed. You pay that to the jitney association in order to get the privilege of being announced at the various dispatching depots and to get reduced rates on gasoline, oil, tires and other supplies. A little later a big garage will be conducted and every registered jitney will get repairs slightly above cost.

To register you present yourself and car at 1133 Grand avenue and talk routes, etc., with E. K. Carnes, the general traffic manager of the company. You select a route you would like to travel. If too many jitneys are on it the suggestion is made that you take another route, but the final act rests with the car owner and operator.

Once registered each car is put on a schedule. Some routes have 2-minute service both ways, others 2.5 and others 5 or 10 minutes, according to the demands. This schedule is maintained and it rarely happens that one car passes another, in general the rotation of a trolley system being maintained.

"How can you make money by carrying a passenger for a nickle—a jitney?" is the question heard on every corner. The proof of the pudding is in the eating. A five-passenger car working on a route 2 or 2.5 miles from end to end is making $7 to $12 per day. These cars make the circuit in 20 to 30 minutes and are generally on streets with trolley lines. With the jitney you can save 10 to 15 minutes on the trolley trip. That is why they are so popular. The jitney company claims that it costs approximately $2.50 per day to run a Ford five-passenger car. It costs very little more for Overlands, Buicks, Studebakers, Hups, Maxwells, etc. One-half the jitneys here are Fords, but in addition to other makes mentioned there are several seven-passenger cars including Packard, Peerless, Oldsmobile, Stoddard-Dayton, Imperial, etc.

Five-passenger cars are possible in jitney service where the ride one way does not exceed 2.5 miles. This is the maximum. The minimum is slightly under 2 miles.

The Seven-Passenger Express

When you get over 2.5 miles and up to 4 miles the seven-passenger car giving an express service beyond the 2.5-mile limit is possible. Over 4 miles the jitney bus offers the only possible conveyance. Some of these buses carry twelve passengers and others twenty. They are single-deckers, entirely inclosed and with glass windows all around. There is generally one side entrance on the right, immediately back of the driver, who sits on a revolving seat, so that when he stops he swings partly around, opening the door and collecting the jitney as the passenger enters. When driving the seat obstructs the door, preventing passengers leaving. Some of these buses are averaging between $20 and $30 per day.

New buses are being registered every day, many of them preferring the 2.5 to 4-mile zone. These buses are generally built on old touring car chassis. A typical example is that of using an Oldsmobile chassis and adding a bus body seating fourteen and costing $200. When a bus has to go beyond the 6-mile zone the single-decker does not pay, but double-deckers will have to be introduced. None has been started yet.

The jitney company reports that all day there is relatively uniform travel. In the early morning the workers going to the factory, the store, or the business office are passengers; a little later the professional man uses the jitney; and later in the forenoon the women shoppers are the majority of the passengers. At lunch time many people are going home, who find this possible with the quick service, but which was impossible with the trolley schedule. During the afternoon shoppers go home and later the workers line the corners in thousands waiting for the jitneys.

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31 Entries for Vanderbilt Cup

SAN FRANCISCO, CAL., Feb. 16—Entries this week of the Tomasini car driven by T. A. Tomasini, the Erwin Special, which is scheduled to be driven by Bergdoll, R. C. Durant in a Chevrolet, Ralph DePalma in a Mercedes, Burman and Hearne in Case Cars, McKelvey in an Overland, Klein's King, and Hall's Hercules, has brought the complete list of cars for the Vanderbilt Cup up to thirty-one. A. H. Woolad-coot of Los Angeles, Cal., also has entered an Alco in the Grand Prix.

With the Vanderbilt race but 5 days off, drivers have not been able to practice on the course. It is doubtful if there will be more than 2 days practice at the outside. All drivers entered for the Vanderbilt are here and the city is crowded with automobile and accessory men from all over the country. Many claim that it would be impossible to run the race if it rains later than Wednesday noon, but race and exposition officials say that it will be run on schedule time. Most of the course is paved and will dry quickly, but there is a 1-mile stretch of dirt to be used which is very muddy. Last week 200 laborers worked night and day, but their work was undone by storm which broke up practice. Another heavy storm occurred Tuesday, and while laborers are now working on the course burning oil to drain off the water, it was stated tonight that there would be no practice until Thursday.

As announced in THE AUTOMOBILE for February 11, Resta will drive only Peugeot cars. Parts did not arrive for McCarthy's car and the machine is now in Los Angeles being prepared for the Venice race. Cadwell was unable to get his Marmon in condition for the Vanderbilt, and D'Alene scored a cylinder in his Marmon in the 100-mile Ascot Park race, making it impossible to start in the Vanderbilt. He will be ready for the Grand Prix, however.

Barney Oldfield says that he will not drive for less than all expenses and all winnings after the Grand Prix. His mechanic, George Hill, is now in the east and it is rumored that he is looking for a foreign car in New York. Harry Goetz will ride with Oldfield.

The complete entry list follows. These entries are those in both Vanderbilt and Grand Prix:

Car	Driver	Entrant
Stutz	Gil Anderson	Stutz Motor Car Co.
Stutz	Earl Cooper	Earl Cooper.
Stutz	Howard Wilcox	Stutz Motor Car Co.
Peugeot	Dario Resta	Peugeot Auto Import Co.
Mercer	Eddie Pullen	Mercer Automobile Co.
Mercer	G. E. Ruckstell	Mercer Automobile Co.
Mercer	Louis Nikrent	Mercer Automobile Co.
Simplex	Louis Disbrow	Simplex Automobile Co.
Chevrolet	Jack LeCain	Chevrolet Motor Co.
Chevrolet	R. C. Durant	Chevrolet Motor Co.
Maxwell	Barney Oldfield	Maxwell Motor Sales Corp.
Maxwell	William Carlson	Maxwell Motor Sales Corp.
Maxwell	Ed. Rickenbacker	Maxwell Motor Sales Corp.
Duesenberg	Edward O'Donnell	F. S. Duesenberg.
Duesenberg	Tom Alley	F. S. Duesenberg.
Delage	C. T. Newhouse	W. E. Wilson.
Tahis	Jack Gable	Fred'k. Robinson.
Edwards Special	Gandy	J. Paulding Edwards.
Edwards Special	Kennedy	J. Paulding Edwards.
Californian	Caleb Bragg	Geo. R. Bentel.
Bugatti	Marquis	J. B. Marquis.
Parsons Special	Jim Parsons	Jim Parsons.
Mercedes	Ralph De Palma	E. C. Patterson.
Gordon Special	Huntley Gordon	Huntley Gordon.
Case	Robert Burman	J. I. Case Co.
Case	E. A. Hearne	J. I. Case Co.
Tomasini	Tomasini	T. A. Tomasini.
Hercules	Hall	Harold Hall.
Overland	T. McKelvey	Thomas McKelvey.
King	Klein	Arthur Klein.
Erwin Special	Bergdoll	G. C. Bergdoll.

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Rajah Offers $300 Race Prize

NEW YORK CITY, Feb. 16—The Rajah Auto Supply Co., Bloomfield, N. J., is offering a prize of $300 in gold to the driver making the best time for first 100 miles of the Grand Prize race, February 27. This is a sporting proposition on the part of the Rajah company as no restriction is placed on the car being equipped with its product.

NEW YORK CITY, Feb. 17—Through an error in copy submitted for the advertising pages of THE AUTOMOBILE for January 14 and February 11 the price of the Rajah Giant plug was given as $1.25 instead of $1.50 which is the correct price.

Factory Miscellany

GOODYEAR'S New Presses—The Goodyear Tire & Rubber Co., Akron, O., recently purchased fifty 150-ton tire applying presses and is planning to increase this order in the immediate future. The presses will be located in all cities where the Goodyear company has branches and in many other cities the machines will be placed with the truck tire dealers. It is to give application service on its S. V. tires that will equal the application service on demountable tires that the company is installing these machines, whose value runs into the tens of thousands of dollars.

To Mfr. Metal Specialties—The Prentiss-Weaver Mfg. Co., Grand Rapids, Wis., has been organized at Grand Rapids, Wis., and incorporated with $20,000 capital, to manufacture a line of metal motor car and farm specialties, including a gasoline gauge, metal auxiliary seats, campers' cookstoves, etc. The incorporators are T. A. Taylor, D. B. Phillo and G. O. Babcock, all of Grand Rapids. This is the concern which G. N. Prentiss of Racine, Wis., inventor and patentee of the devices, has been forming at Grand Rapids for some time.

U. S. Wheel Perfects Organization—The United States Wheel & Tire Co. of Rockton, Wis., south of Beloit, Wis., has perfected its organization by the election of these officers: President, E. S. Gleasman; vice-president, G. W. Shaw; secretary, N. M. Wilcox; treasurer, J. Roy Atwood. The company has been given a donation of a 4-acre factory site in Rockton and is preparing for the erection of a brick and concrete factory, 100 by 100 feet in size, equipped for the manufacture of an elastic or flexible wheel for motor cars and trucks. The resiliency is obtained by means of a series of flat elliptical springs so arranged that the tire proper is able to withstand an even greater side stress than the spokes of the wheels themselves. Frank Denny has been appointed sales manager.

Samson May Move—Additional capital of $50,000 for the Samson Engineering Co., Louisville, Ky., which manufactures a single unit starting, lighting and ignition system for motor cars, has been pledged by an Eastern man, provided another $50,000 is otherwise subscribed to enable the company to so extend its facilities and be able to handle large orders. An offer from Eastern interests to move the plant, now located in the Snead manufacturing building to Plainfield, N. J., is under consideration, and the Louisville Commercial Club is trying to interest local capital in order to retain the industry. The company plans to widen the scope of its business, employ more men and purchase additional machinery. The system is the invention of J. K. Delano, Jr., and it is said that large manufacturing concerns have given assurances of their interest in the local concern's product.

Trenton Plants Busy—A number of the large factories in Trenton, N. J., report increased business and a few of them are operating night and day. Several of the tire concerns have increased their forces. F. W. Roebling, Sr., secretary and treasurer of the J. A. Roebling Sons' Co., states that this company will begin rebuilding as soon as possible that part of its plant destroyed by fire a few weeks ago. When it is finished an extra force of men will be put to work at night, so that part of the factory will be running night and day. Every manufacturer of automobile tires is doing a good business and orders are increasing. One concern has doubled its output. Another is so pressed that the men are working in three shifts of 8 hours each. The Empire Rubber Co. is employing 1,000 men, an increase over a month ago. Gen. C. E. Murray, the treasurer of the company, states that the company's business is just double what it was. The Acme Rubber Co. is employing 500 men and is working full time. The Ajax Rubber Co. has 500 men working in three shifts of 8 hours each, which means night and day, 6 days in the week. The trade of the company is entirely domestic. No war orders are being filled. The Globe Rubber Co. is getting ready to double its capacity. The works have not been running full time, but probably within 2 weeks 300 men will be drawing pay for full time. Among other rubber factories that are beginning to show renewed activity are the Essex Co., Lighthead Bros., Thermoid Rubber Co., Home Rubber Co., and the Crescent, which is controlled by the Empire.

The Automobile Calendar

Feb. 15-20.....Grand Rapids, Mich., Show, Klingman Furniture Exposition Bldg., Grand Rapids *Herald;* C. L. Merriman.

Feb. 15-20.....Omaha, Neb., Show, Auditorium, C. G. Powell

Feb. 15-20.....Bridgeport, Conn., Show, State Armory; B. B. Sterber.

Feb. 17-20.....York, Pa., Show, Coliseum.

Feb. 18-20.....Racine, Wis., Show, Lakeside Auditorium, Racine Auto Show Assn.

Feb. 22.....Newark, N. J., Light Car Club of N. J., Hillclimb at Teaneck.

Feb. 22.....San Francisco, Cal., Vanderbilt Cup Race, Panama-Pacific Exposition Grounds; Promoter, Panama - Pacific Exposition Co.

Feb. 22-25.....Allentown, Pa., Show.

Feb. 22-27.....Duluth, Minn., Show, Auditorium.

Feb. 22-27.....New Haven, Conn., Show, Second Regiment Armory; W. N. Lindsay.

Feb. 22-28.....South Bethlehem, Pa., Show, Coliseum; J. L. Elliott.

Feb. 23-27.....York, Pa., Show, Coliseum Hall.

Feb. 23-27.....Syracuse, N. Y., Show, Armory, Syracuse Auto Dealers' Assn.; H. T. Gardner, Mgr.

Feb. 23-27.....Ft. Dodge, Ia., Show, Armory, C. W. Tremain, Sec.

Feb. 24-27.....Freeport, Ill., Show, Freeport Automobile Show Co.

Feb. 25.....New York City, S. A. E., Metropolitan Sec. Meeting; Report of Research Committee on Kerosene Carbureters. Research Com. Report on Non-Electric Continuous-Torque Transmission.

Feb. 27.....San Francisco, Cal., Panama-Pacific Exposition, Grand Prize Race, Panama - Pacific Exposition Grounds; Promoter, Panama-Pacific Exposition Co.

Mar. 1-5.....Wilkesbarre, Pa., Show. Vehicle Trades Assn.

Mar. 1-6.....Fargo, N. D., Show, Armory.

Mar.....Benton Harbor, Mich., Show, St. Joseph and Benton Harbor, St. Joseph Garage, St. Joseph.

Mar.....Charlotte, Mich., Show.

Mar. 2-9.....Brooklyn, N. Y., Show, Motor Dealers' Assn., 23rd Regiment Armory.

Mar 3.....Albany, N. Y., Associated Garages of America, General Convention.

Mar. 3-4-5-6.....St. Joseph, Mich., Show, St. Joseph Auto Co. Bldg.

Mar. 4-6.....Springfield, Mass., Show; J. H. Graham.

Mar. 6-13.....Boston, Mass., Show, Mechanics Bldg., Boston Auto Dealers Assn., Boston Commercial Motor Veh. Assn.

Mar. 6-13.....New York City, Made in the U. S. A. Exhibition, Grand Central Palace.

Mar. 8-13.....Indianapolis, Ind., Annual Spring Opening, Indianapolis Auto Trade Assn.

Mar. 8-13.....Canton, O., Show, Auditorium, Stark Co. Auto Show and Electrical Exposition.

Mar. 8-13.....Des Moines, Ia., Show, C. G. Van Vliet.

Mar. 8-13.....Utica, N. Y., Utica Automobile Trade Assn.

Mar. 13-20.....Harrisburg, Pa., Show Arena, Harrisburg Dealers' Assn.

Mar. 14.....San Francisco, Cal., Panama - Pacific Cup Race, Panama - Pacific Exposition Grounds; Promoter, Panama - Pacific Exposition Co.

Mar. 17.....Venice, Cal., Cal. Grand Prix, 300-Mile Road Race.

Mar. 22-27.....Bangor, Me., Show, Bangor Auditorium.

April.....Calumet, Mich., Show, Coliseum.

April 3.....Paterson, N. J., Show, Auditorium, R. A. Mitchell.

Apr. 16.....Manchester, Eng., Show, Ice Palace, North of England Motor Shows, Ltd.

May 17-18.....Boston, Mass., A. A. A. Annual Meeting.

May 29.....Indianapolis, Ind., 500-Mile Race, Indianapolis Motor Speedway.

June 9.....Galesburg, Ill., Two-mile Track Meet.

June 19.....Chicago, Ill., 500 - Mile Race, Chicago Speedway.

June 25.....Sioux City, Ia., Track Meet.

July 4-5.....Tacoma, Wash., Road Race.

Aug.....Milwaukee, Wis., Independent Petroleum Marketers' Assn. of the U. S.; 1915 Convention in Milwaukee.

Aug. 2-3.....San Francisco, Cal., Tri-State Good Roads Assn., Third Annual Convention.

Aug. 20-21.....Elgin, Ill., Road Race.

Sept. 20-25.....San Francisco, Cal., International Engineering Congress.

The Week in the Industry

Motor Men in New Roles

CORE Sparton Advertising Mgr.—G. C. Core has been appointed advertising manager of the Sparks-Withington Co., Jackson, Mich., Mr. Core is a former Chicago newspaper man and for the last 3 years has been connected with the automobile department of the *Chicago Daily Journal.*

Harmon Dort District Mgr.—Kenton Harmon has been appointed Metropolitan district manager of the Dort Motor Car Co., 1790 Broadway, New York City.

Travis King Agency Sales Mgr.—J. T. Travis has been appointed sales manager of the Carpenter Motor Vehicle Co., Brooklyn, N. Y., agent for the King car.

Henderson Sales Mgr.—R. H. Henderson is now the sales manager of the Pacific Metal Products Co., Los Angeles, distributor for the Moore and Commerce trucks.

Bowman Federal Sales Mgr.—J. F. Bowman, assistant to the secretary and treasurer of the Federal Motor Truck Co., Detroit, Mich., has been appointed director of sales.

Towne Makes Change.—W. M. Towne, formerly with the Ajax-Grieb Rubber Co., Detroit. Mich., is now a general sales representative of the F. E. Castle Co., manufacturers representatives.

Liston Thermoid Mgr.—J. H. Liston has been appointed manager of the Detroit, Mich., offices of the Thermoid Rubber Co., which has recently been opened in the Dime Savings Bank Bldg.

Perrett Republic Branch Mgr.—W. M. Perrett has been appointed branch manager of the Republic Rubber Co., Youngstown, O. His headquarters will be at 1001 Woodward avenue, Detroit, Mich.

Davis Penn Spring Mgr.—Offices will be opened soon in Detroit, Mich., in the Whitney Bldg., Woodward avenue, by the Penn Spring Works, of Baldwinsville, N. Y. Robert Davis will be the manager.

Bailey Mgr.—The Toledo-Mercer Co., Toledo, O., has been formed with L. C. Bailey, as manager. The company will sell the Mercer cars. Headquarters are located at the Twenty-first street Garage.

Schmunk Peerless Mgr.—W. G. Schmunk has been appointed manager of the Ohio branch of the Peerless Motor Car Co., Cleveland. He has been connected with that organization for the last 5 years.

Bushong Joins Ostlund Co.—J. H. Bushong, for 12 years in the service of the John-Deere implement organizations, has resigned to take a half interest in the automobile business of A. J. Ostlund of Moline, Ill.

Trudell Located in Jackson—W. J. Trudell traveling representative for the Goodyear Tire & Rubber Co., Akron, O., has taken up headquarters in the Adams Hotel, Jackson, Mich., and will be located there permanently.

Pearne Used Car Mgr.—W. A. Pearne, formerly of Vancouver, B. C. and Spokane, Wash., with the Winton, has been engaged as manager of Geo. W. Miller's used parts and supply department at 714 East Pike street, Seattle.

Roberts Sales Mgr.—H. R. Roberts, former head of the Winton branch in Portland, Ore., has been made sales manager for the Frank C. Riggs Co. in that city, distributor of Packard cars. Mr. Roberts is president of the Portland Automobile Dealers' Assn.

Buhr Elected President.—The capital stock of the American Pattern Works, Dubois and Clay streets, Detroit, Mich., has been increased from $10,000 to $50,000. J. F. Buhr has been elected president, William Blanck vice-president, and Edward Stephens secretary.

Orman Heads Premier Dept.—Frank E. Smith, receiver for the Premier Motor Mfg. Co., Indianapolis, Ind., has announced the appointment of J. B. Orman to have charge of the funeral equipment department. Mr. Orman was advertising director of the company before it went into the hands of a receiver.

Stokes Leaves for Cuba.—J. O. Stokes, president of the Thermoid Rubber Co., Trenton, N. J., is making a trip to the South touching on Cuba and going up to the coast to study conditions. The Thermoid company recently opened offices and a service department in the Dime Savings Bank Bldg., Detroit, Mich.

Smith N. Y. Maxwell Mgr.—L. F. Smith, district manager in Columbus, O., for the Maxwell Motor Car Co. has been promoted to the management of the New York City branch and will have territory in Connecticut, Rhode Island, New Jersey, Long Island and part of New York State. He will assume charge about March 1.

Garage Co. Elects Officers—At the annual meeting of the Auto Garage Co., Manistee, Mich., a dividend of 4 per cent. was declared and paid. Henry Brugman was elected president, Dr. A. S. Payne, vice-president; T. J. Elton, secretary-treasurer. These officers and Otto Brugman and Alexander Smith form the Board of Directors.

Sell Heads Assn.—The Independent Automobile Assn. met in the offices of the Penn Motor Sales Co., Greensburg, Pa., and effected a permanent organization. The following officers were elected: President, J. B. Sell; vice-president, L. L. Lowe, Youngwood; secretary, J. A. Eisaman, Greensburg; treasurer, W. M. Pletcher, Penn Motor Sales Co.

Recent Cincinnati Changes—Chick Radcliffe, formerly connected with the sales department of the Leyman-Buick Co., Cincinnati, O., has been made manager of the Leyman Motor Co. A. H. MacDonell has been promoted from the position of sales manager to the office of district manager, with headquarters there and with jurisdiction over all Buick agencies and also over Buick agencies in Indiana counties touching the Ohio river.

Zaring Indianapolis Maxwell Mgr.—The Indianapolis, Ind., Maxwell distributors, the Maxwell Motor Corp., has opened a new salesroom and service station at 541 North Capitol avenue. E. C. Zaring is manager of the retail sales department, and R. L. Malcom of the wholesale department. The local service department is in charge of J. F. Requarth, and the out of town service will be looked after by C. E. Troutman.

Ehnts Makes Change—F. H. Ehnts, connected with the Dorris Motor Car Co., St. Louis, Mo., for nearly 8 years has resigned his position as sales manager to embark in another line—sales manager of the Superior Oxygen Co. Mr. Ehnts has been in the automobile business for many years being at different times connected with the American Mors, then built in St. Louis, and with the Carter Carbureter Co. No successor has been named thus far.

Recent Smalley Daniels Changes—W. B. Dean who was several years purchasing agent of Hearsey-Willis Co., automobile supply jobbers of Indianapolis, Ind., has joined Smalley Daniels, 870 Woodward avenue, Detroit, Mich., in the exploitation of New Era Spring & Specialty Co.'s lines and will have direct charge of the jobber's department. J. K. Taylor of Detroit, has become office manager at Detroit, and A. B. Camis of Chicago has become Chicago sales representative.

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Garage and Dealers' Field

Lancia-Sheffield Agency Moves—The Lancia and Sheffield Simplex salesrooms have been moved to larger quarters in 59th street, just east of Broadway, New York City.

Thos. J. Hay Moves—Thos. J. Hay, Hupmobile and Chandler dealer in Chicago, Ill., has moved to 2519 and 2521 Michigan Boulevard. The floor space of the new building is 30,000 square feet.

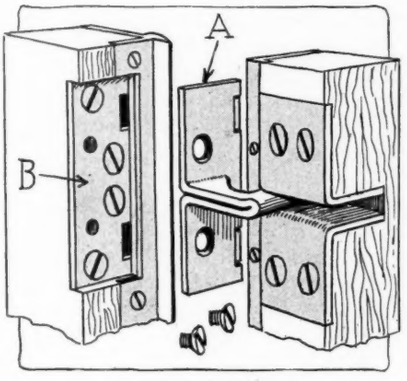
Fire Damages Grand Rapids Bldg.—Fire in the Benham building, Library street, Grand Rapids, Mich., caused damage to the extent of $60,000 it was stated, much of which was sustained by automobile accessory concerns having their quarters in the building.

Takes Philadelphia Exide Distribution—Patton Fleming & Co., 2039 Ranstead street, Philadelphia, Pa., manufacturers' representatives, have been commissioned by the Electric Storage Battery Co., manufacturer of the Exide battery, to act as distributors and battery service depot in that section.

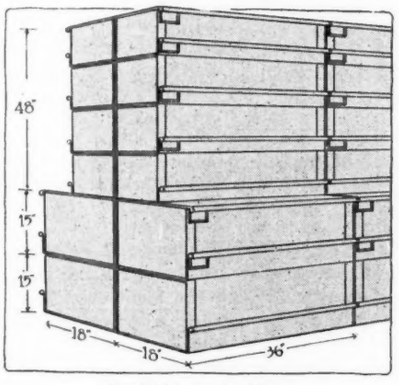
N. Y. City's Municipal Garage—New York City will have its own garage and a municipal taxicab service within a very short time. Plans are being completed and as soon as possible the city automobile service will be started. There are in all about 200 automobiles in the service of that city. It is the plan of the Mayor to establish municipal garages in both Manhattan and Brooklyn. A rate schedule is to be devised for the use of the cars, and when one is taken out, it is to be charged to the department using it. City taxis are to be of a uniform color and are to be marked with the name of the city in large letters.

ACCESSORIES

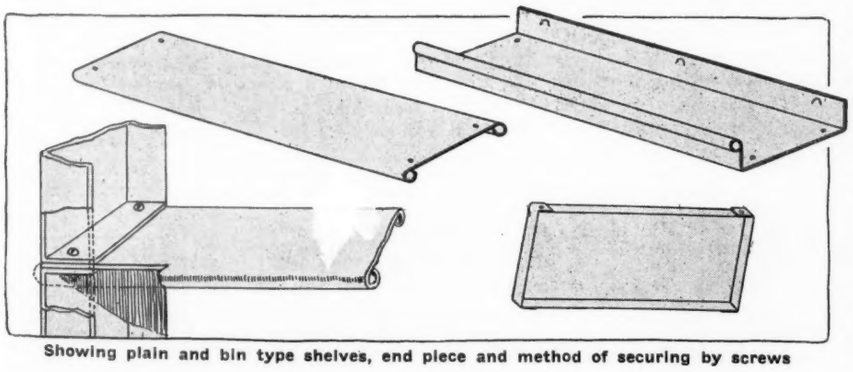
STOCKROOM SHELVING — Everyone is familiar with the unit system of construction as applied to bookcases; the so-called expanding bookcase which is built up of numbers of interchangeable sections, sometimes each of the same size and sometimes of different sizes, but always so fitting together as to make a complete whole which can always be enlarged by adding a fresh unit. In order to carry this system to stockroom shelving several matters must be taken into account that do not appear in the library field, for instance much greater strength is required, waste space is even more important and cheapness must be considered very carefully indeed. The Fouts unit system of steel shelving has been introduced lately, and seems to meet practically every requirement of stockroom organization while it has the great advantage over ordinary steel construction that it can always be altered in height, depth or length to suit the needs of the articles at that time mostly in use. The fundamental part of the shelving is the end, which is a steel pressing in the form of a shallow box. These end pieces are made in a wide variety of sizes the largest being 24 in. high by 36 in. deep and the smallest 6 in. high by 12 in. deep. The shelves are made of a standard length of 36 in. and in widths to suit the range of sizes of the end pieces; each edge of a shelf is rolled into a bead so doing away with sharp edges. Besides plain shelving, box form pressings can be had that make up into bins when attached to the standard end pieces, and partitions are also procurable for dividing either bins or shelves. It is usual so to arrange the built up shelving that there are two open sides, but if it is desired to divide the whole structure lengthwise, back plates which clip into place are added and two piles of shelves built up back to back. The various members are secured to each other by short screws and nuts as shown in the illustration. It is claimed that the shelving can support a very considerable weight, and the parts are made in different gauges of sheet to suit goods of different degrees of weight. For automobile parts it is probable that the heaviest gauge would be the most suitable. Obviously the case built up in this way is more durable than wooden bins, besides being incombustible, and the small number of screws needed means that erection would be very quick. It should be quicker than nailing together ready shaped pieces of wood.—C. C. Fouts Co., Middletown, O.



Concealed door hinge



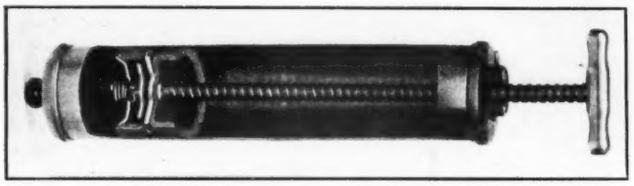
Steel bins as built up


Showing plain and bin type shelves, end piece and method of securing by screws

Detachable Concealed Hinge—A very neat door hinge with the feature that it allows for easy detachment of the door is known as the Anchor. It is a common experience to find that doors have to be removed for trimming after they have been mounted by the body frame builders and it is obviously likely to cause damage to the finish if wood screws have to be removed after painting is completed. To overcome this possible trouble the Anchor hinge is fitted in the door post, as shown in the sketch, and the door itself is provided with the fixed plate B in which there are two locating slots and two tapped screw holes. On the plate A of the hinge are two lugs to fit the locating slots in B, and a pair of short machine screws secure the hinge to the door plate; so attachment or removal of the door are quick and easy operations.—Metal Specialties Mfg. Co., Chicago, Ill.

Tire Pump—A hand tire pump with a special type of plunger and hose clamp, which makes it very easy to attach the end of the hose to the tire valve, is the "Bell." The end of the plunger rod is threaded and this provides for the holding of the plunger leather between two washers by a nut. Underneath the plunger leather a bevel-edged brass spreader disk is sleeved upon the plunger rod and held to it at all times by a spring, which is in turn held in place by a cottered washer on the rod end. When the plunger is forced down, the back pressure of the air in the pump barrel forces the spreader disk up strongly against the plunger leather and holds it closely to the walls of the barrel. On the up-stroke, the steel spring maintains the close contact of the leather against the walls of the barrel. A ball-check valve at the base prevents back pressure into the pump. To replace the ordinary rubber socket at the tire valve end of the hose connection, the "Bell" has a special form of eccentric clamp. This has a rubber socket, but in addition, it has a threaded internal eccentric which operates internally upon the threaded part of the tire valve tube. After engaging the rubber socket with the valve tube in the usual way, the eccentric lever is pushed over, whereupon the threaded eccentric inside the clamp engages the external threads of the valve tube in the same manner as a nut would, making a rigid connection which will stay until the lever is thrown to the releasing position again.—Bell Pump Co., Detroit, Mich.

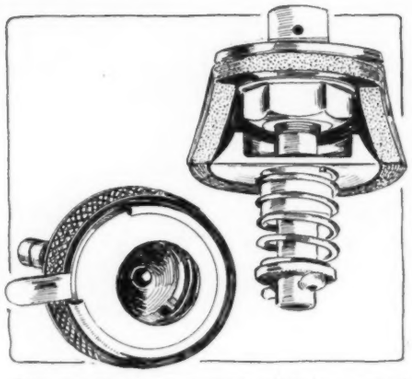
Grease Gun—Oil and grease guns are automobile accessories which the average motorist looks upon as standard; however, this particular one seems to be a combination which is a step in advance. Referring to the illustration, the gun in-

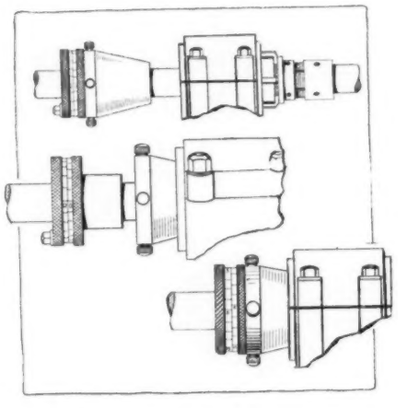


Bell grease gun and details of Bell pump plunger and valve connection

corporates a modification of the Bell plunger as used in tire pumps of this make. The leather plunger is secured to the plunger rod and is cup-shaped. Below the leather is a disk which is beveled at its outer edge. This fits inside the leather cup and is held to it at all times by a spring. Above the main leather cup there is another in reversed position. On the down stroke, the pressure of the oil or grease forces the disk against the cup, and thus makes the latter closely adhere to the walls of the gun so as to prevent leakage. On the up-stroke the spring acts to force the metal disk against the leather which must therefore maintain the same close contact with the walls. This prevents leakage in this direction, and it is assisted by the reversed leather plunger. It is said that with this feature, the gun has a vacuum which will readily draw a No. 2 grease. Heavier greases are packed by hand. To empty the gun, an eccentric ring is fitted to the top of the gun. By the quarter turning of a lever, an eccentric disk fits into the square thread of the plunger rod, and makes a nut on which the thread can operate. Then by turning the handle, the grease is expelled. Thus, the gun is a combination, for, with the eccentric off, it acts similarly to any plunger gun, and is readily converted into a screw type.—Bell Pump Co., Detroit, Mich.

Fitting Crankshaft Bearings.—It is an accepted fact that it is far from easy properly to scrape and fit the bearings of a crankshaft so that they are all in line and all an equally tight fit. In the best factories all cranks are scraped in by hand and many hours spent on getting the bearings as near perfect as possible, but it is well known that when the car eventually comes to a repairer for wear to be taken up the re-scraped bearing seldom last so long as they did originally. There is only one reason for this, and it is that the average mechanic is not skilled in the class of work required to make a proper job of crankshaft bearings; it is a kind of work that really calls for special practice and is best done by a man who has no other sort of work. It is with the idea of enabling the better kinds of repair shops to do really good work with a smaller expenditure of time that the tool here described has been made. Given a crankshaft and its bushings it is a foregone conclusion that they will not wear evenly, that means one or more of the bearings will be out of line when the time comes to take up slack. Now the important thing is to get the nearest possible approach to correct aligning and it is also important to locate the shaft so that the timing gears mesh to the proper depth. In using the apparatus described it is the timing gear which forms the basic point; the front bearing is reamed to suit the meshing of the gears and the other bearings to suit the front one. The Martell aligning reamer consists of an accurately straight shaft capable of carrying and sliding within taper bushings by means of which it can be set up and adjusted in the crankcase. When adjusted to proper centers a reamer head on the same shaft can be drawn through the bushings, cutting them one after the other till they are accurately in line within very fine limits. Free to slide on the shaft is a number of eccentric bushings outside which the taper portions are located. Thus suppose the shaft is held in the end bearings by the taper bushes pushed into the bearing mouths and then locked in place, we can set the shaft several thousandths out of line one way, or the other by turning the inner eccentric portions. In this way the timing gear can be located in proper mesh, since a special mounting is provided for the shaft of the reamer which will hold the pinion just as though it were upon the crankshaft. The adjusting edges of the eccentrics are graduated so as to show how many thousandths the shaft is out of line with the bearing and, speaking broadly, the operation before starting to ream, consists in adjusting the shaft by means of the taper bushings relative to each crankshaft bearing so as to get the best average position consistent with proper timing gear position. When this adjustment is finished the reamer head is locked to the shaft at any convenient point by its clamping grip ring, and the bearings are scraped out by the reamer one at a time, the bushings being replaced, set back to zero eccentricity, and each bearing reamed before the next bearing is begun upon. The process as thus described sounds a little complicated perhaps, but it must be infinitely simpler than hand scraping, and actually better in final effect if the workman is only capable of understanding what he is trying to do. The tool should find a place in most high-class shops and should enable the charge for refitting bearings to be reduced—as well as giving better results.—Martell Distributing Co., Boston, Mass.





Taper bushings of Martell aligning reamer showing eccentric adjustment and locking screws, also grip lock for reamer

Automobile Washing Apparatus—A variety of dusting and washing brushes of strong and simple construction are garage essentials. A recent list shows that the Fuller range is exceptionally complete. The Fuller auto-washer, fountain type, consists of a large brush that is fitted to the end of the hose nozzle, and it is to be noted that it does not need a special nozzle, clipping readily to any ordinary hose end.—Fuller Brush Co., Hartford, Conn.

Graphite Lubrication—This subject has been dealt with most ably in many pamphlets issued by the Dixon company, but they have just issued another containing detail recommendations for the use of each brand of graphite product applicable to the automobile.—Joseph Dixon Crucible Co., Jersey City, N. J.

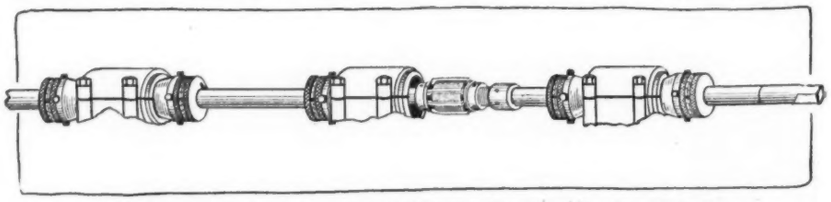


Diagram of reaming shaft ready for reaming operation in crankcase